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## THE FIRS OF MEXICO AND GUATEMALA

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*With a text figure*

FOR MORE than a century *Abies religiosa* (H.B.K.) Schlecht. & Cham. was supposed to be the only species of *Abies* growing south of the boundary of the United States, if we except the Rocky Mountain fir, *Abies concolor* (Gord.) Engelm., which was found in 1893 by T. S. Brandegee in northern Lower California. Recently, however, a new species was described from sterile material by Flous and Gaussen, representing the tree of the mountains of Oaxaca; cones of that species were collected last year by Dr. J. H. Faull, who also brought back from his last journey to Guatemala fruiting material of a fir which proves to be a distinct new species.

This material together with the specimens already in the Arnold Arboretum (A.A.) herbarium, the material from the Gray Herbarium (G.H.) and the National Herbarium (U.S.) and a specimen collected by G. U. Skinner from the Kew Herbarium, for the loan of which we are obliged to the curators of these herbaria, has enabled us to give the following account of the firs of Mexico and Guatemala. For assistance in the study of the internal structure of the leaves of the three following species, I am indebted to Dr. J. H. Faull.

***Abies religiosa*** (H.B.K.) Schlechtendal & Chamisso in Linnaea, 5: 77 (1830). FIG. 1, A-D

*Pinus religiosa* Humboldt, Bonpland, Kunth, Nov. Gen. Sp. Pl. 2: 4 (1817).—Parlatore in DC. Prodr. 16<sup>2</sup>: 420 (1868).

*Pinus hirtella* Humboldt, Bonpland, Kunth, l. c. (1817).

*Abies hirtella* Lindley in Penny Cycl. 1: 31 (1833).

MEXICO. Nue vo Leon: Sierra Madre, 140 miles south of

Saltillo, *E. Palmer*, March 1880 (G.H.). Sinaloa: without precise locality, *J. S. Ortega* 113 (U.S.). San Luis Potosi: *Virlet*, Aug. 8, 1851 (Herb. Paris, ex Viguié & Gaussen); region of San Luis Potosi, 6000–8000 ft., *Parry & Palmer* 847 (ex Hemsley, Biol. Centr.-Am. Bot. 3:190. 1882–6). Hidalgo: Sierra de Pachuca, 9200 ft., *C. G. Pringle* 13802, Aug. 28, 1906 (G. H., U.S. with cones, A.A.); Mts. near Pachuca, *J. N. Rose & W. Hough* 4454, June 1, 1899 (U.S., with cone scales). Jalisco: Volcano of Colima, *M. E. Jones* 490, July 13, 1892 (U.S.). Mexico: Temascaltepec, Las Cruces, 3350 m., *G. B. Hinton* 3259, 2–7–1933 (A.A.); Sierra de las Cruces, 9000–11000 ft., *C. G. Pringle* 4357, Oct. 21, 1892 (A.A., U.S.); Mt. Popocatepetl, 8500–11500 ft., *Nelson & Goldman*, Jan. 7, 1894 (U.S. no. 1743094, with cone); *J. N. Rose & R. Hay* 6051, Aug. 7–8, 1901 (U.S.); *J. H. Faull* 13270, 13271, 13272, Dec. 13, 1938 (A.A.); "Ixtacchuatl" [ ? Ixtahuatlan] 10–12000 ft., *C. A. Purpus* 33, Jan. 1903 (U.S. with ♂ fls.); Acapulco, 7000 ft., *John A. Gamon* 14, March 14, 1921 (U.S.); Amacameca, *Geo. L. Fisher* 87, July 29, 1924 (U.S. with ♂ fls.); El Oro, alt. 2800 m., *Rangel* 6628, Nov. 1910 (U.S.); Ajusco, alt. 8500 ft., *J. H. Faull* 13103, Nov. 23, 1937 (A.A., with cone); Zempoala Nat. Park near Cuernavaca, elev. 8000 ft., *J. H. Faull* 13275, Dec. 1, 1938 (A.A.). Puebla: Manzanilla, vicinity of Puebla, *Bro. Arsène (Bro. Nicolas)* 6109, Nov. 17, 1911 (A.A., U.S.). Vera Cruz: Mt. Orizaba, near Cordoba, 2700 ft., *Henry A. Seaton* 233, Aug. 20, 1891 (G.H., U.S.). Mt. Orizaba, *J. N. Rose & R. Hay* 5752, July 25–26, 1901 (U.S.); Tlacotalpan, *E. W. Nelson* 515, May 21, 1894 (U.S.).<sup>1</sup> Without precise locality: "Mexico," *Dr. J. Gregg* 663, 1848–49 (G.H.).

This species, the type of which was collected by Humboldt and Bonpland between Mazatlan and Chilpancingo, ranges from Nuevo Leon and Sinaloa to Jalisco and western Vera Cruz and occurs in the higher mountains at 2600 to 3350 m. altitude. It is easily distinguished from the two following species by the acute or acutish leaves and the large cone with exserted and reflexed bracts. The two vascular bundles of the leaves are close together while in the two following species they are more widely separated; the hypoderm is continuous or only slightly interrupted below the upper surface, less strongly developed below; there are always two subepidermal resin-canals along the lower surface near the margin of the leaf.

Viguié and Gaussen in their Revision du genre *Abies* (in Soc. Hist. Nat. Toulouse, 58: 502–503; Trav. Lab. For. Toulouse, II, art. 1: 324–325.

<sup>1</sup>The locality given by Nelson is close to the coast and it seems very doubtful if any species of *Abies* would grow there.

1929) cite among the synonyms *Abies glauca* Roetzl, *A. glaucescens* Roetzl, *A. Lindleyana* Roetzl, *A. Tlapalcatuda* Roetzl and their subsequent combinations, but all these names are probably referable to *Pseudotsuga taxifolia* (Poir.) Britt., and are enumerated as doubtful synonyms of *Pseudotsuga Flahaultii* Flous (in Bull. Soc. Hist. Nat. Toulous 71: 92; Trav. Lab. For. Toulouse, Tome II, vol. IV, art. 2: 60, 1936). Miss Flous' species is apparently only a slight form of the Rocky Mountain Douglas fir, *P. taxifolia* var. *glauca* (Beiss.) Schneid., considered a distinct species by Mayr and by Flous, a subspecies by Schwerin, a forma by Voss and published as a straight trinomial by Sudworth.

**Abies Hickeli** Flous and Gaussen in Bull. Soc. Hist. Nat. Toulouse, 64: 24, fig.; in Trav. Lab. For. Toulouse, I, art. 17: 1, fig. (1932).

FIG. 1, E-I

Arbor: ramuli rubro-brunnei, pulvinis linearibus sulcati, tenuiores, laterales praecipue in sulcis satis hirtelli, robustiores et fructiferi glabrescentes vel glabrae; gemmae ovoideae, obtusae, valde resinosae.



FIGURE 1. *ABIES RELIGIOSA* (HBK.) Schlecht. & Cham. A. Leaf,  $\times 3$ .— B. Cross-section of leaf,  $\times 15$ .— C. Scale with seeds, nat. size.— D. Scale with bract, nat. size. — *ABIES HICKELI* Flous & Gauss. E. Leaf,  $\times 3$ .— F. Cross-section of leaf from a sterile branch,  $\times 15$ .— G. Cross-section of leaf from a fertile branch,  $\times 15$ .— H. Scale with seeds, nat. size.— I. Scale with bract, nat. size. — *ABIES GUATEMALENSIS* Rehd. J. Leaf,  $\times 3$ .— K. Cross-section of leaf  $\times 15$ .— L. Scale with seeds, nat. size.— M. Scale with bract, nat. size.



Folia subdisticha, sub angulo fere recto patentia, linearia, 1.2–2.6 cm. longa et circiter 1.25 mm. lata, apice obtusa et emarginata, supra pallide viridia, sulcata, subtus cinereo-viridia, costa media leviter elevata, fasciis stomatiferis vix conspicuis e seriebus stomatum 7–8 compositis; canales resiniferi 4–8 (raro 10), 2–4 (raro 5) in folii facie inferiore subepidermales 1–4 (raro 5) in parenchymate partis superioris folii siti; hypoderma bene evolutum sed hic inde interruptum in foliis ramuli fertilis, minus conspicuum in eis ramuli sterilis; fascies fibro-vasculares 2, bene distincti. Strobili subsessiles, maturi oblongo-cylindrici, 6–7 cm. longi et 2.5–3.5 cm. diam., obscure brunnei, apice obtusi; bractee oblongo-lanceolatae, circ. 2 cm. longae et 6–7 mm. latae, sensim in apicem acuminatum attenuatae, squamam multo superantes, erectae, incurvae et strobilo accumbentes vel leviter patentes, margine inaequaliter inciso-serrulatae; squamae late cuneato-obovatae, 1.4–1.5 cm. altae et 1.8–2 cm. latae, margine extus hirtello-puberulae subito in stipitem circ. 4 mm. longum contractum, alis leviter recurvis et plus minusve auriculatis margine eroso-denticulatis. Semina 6–7 mm. longa, alis subrotundatis squamam fere aequantibus circ. 7 mm. longis et 8–9 mm. latis.

MEXICO. O a x a c a : Alt. 1650 m., *C. Conzatti* in 1900 (type in herb. Bonaparte, Lab. Bot. Lyon, sterile); Cerro de Yalina, alt. 3000 m., *C. Conzatti* 951, June 1899 (G.H.); San Juan del Estado, Distr. da Etlá, *C. Conzatti*, Apr. 8, 1938 (sterile); Cerro San Felipe, Distr. dal Centro, alt. 2500–3000 m., *C. Conzatti*, Apr. 8, 1938 (sterile); Ixtepi, Sierra Juarez, Mt. San Felipe, alt. 2500 m., *J. H. Faull* 13268, 13269, Dec. 5, 1938 (with cones); Rancho Tablas, Distr. de Ixtlan, alt. 2500 m., *J. H. Faull* 13274, Dec. 7, 1938 (with cones) (all in herb. A.A.). ? V e r a C r u z : Orizaba, *Botteri* 225, about 1855 (G.H.).

This species was first described in 1932 by Flous and Gaussen, based on a sterile branch collected by *C. Conzatti* in 1900. As complete material is now available, cones having been collected by Dr. *J. H. Faull* last year, a full Latin description is given above. The species is readily distinguished from *A. religiosa* by the emarginate leaves with 4–8 resin-canals, the smaller cones with oblong-lanceolate bracts exceeding the scales and directed upward and more or less incurved or sometimes slightly spreading, but never reflexed as in *A. religiosa*. From the following species which also has emarginate leaves, it differs in the smaller cone with exserted bracts and in the leaves with 4–8, rarely 10, resin-canals partly subepidermal and partly situated in the parenchyma near the upper surface of the leaf, and in the less copious hypoderm. The species seems to be restricted to the central mountains of Oaxaca occupying an area situated between that of *A. religiosa* and the following

species. The locality "Orizaba" of Botteri's specimen<sup>1</sup> seems doubtful, for two other collections cited above under *A. religiosa* from the Peak of Orizaba represent the latter species; it is unlikely that both species are growing on the Peak of Orizaba which is well within the range of *A. religiosa*, being in the same latitude as the stations in the District of Mexico and of Puebla. It is possible that part of the specimens collected by Botteri came from Oaxaca, for Hemsley mentions (Biol. Centr. Am. Bot. 4: 133) that a small collection of Mexican plants from Professor Sumichrast of Tehuantepec in Oaxaca, was presented in 1877 to Kew by De Candolle, which bears the same numbers for the same species as Botteri's. Tehuantepec is situated about 70 miles southeast of the mountains where *A. Hickeli* is found.

***Abies guatemalensis*, spec. nov.**

FIG. 1, J-M

*Abies*, sp. n. ? Hemsley, Biol. Centr.-Am. Bot. 4: 89 (1887), nom. nud.

Arbor ad 35 m. alta, trunco 60-90 cm. diam. (ex coll. A. F. Skutch) ramuli fusco-brunnei, pulvinis linearibus sulcati, steriles sat dense, fructiferi sparsius hirtelli; gemmae globoso-ovoideae, valde resinosae. Folia subdistichia, sub angulo fere recto patentia, inaequalia, linearia, 1.5-3 cm. longa et 1.25-2 mm. lata, apice obtusa et emarginata, supra laete viridia, nitidula, sulcata, subtus costa media elevata, marginibus recurvis, fasciis stomatiferis satis conspicuis e seriebus stomatum 8-10 compositis; canales resiniferi 2, subepidermales; hypoderma bene evolutum hic inde interruptum; fascies fibro-vasculares 2, approximati sed distincti. Strobili subsessiles, oblongo-cylindrici, 8.5-11.5 cm. longi et 4.5-5 cm. diam.; bractee cuneato-obovatae, inclusae et dimidiam squamam aequantes, apice late truncatae et eroso-denticulatae, in medio paullulo vel vix productae; squamae transverse oblongae, circ. 3 cm. latae et 2-2.2 cm. altae, margine extus hirtello-puberuli, alis inaequaliter eroso-denticulatis, basi auriculata et in stipitem 5-6 mm. longum subito contractae; semina cuneato-obovoidea, 8-9 mm. longa, pallide brunnea, alis obovatis 1-1.5 cm. longis et 1.4-1.5 cm. latis.

GUATEMALA. Without special locality, *G. U. Skinner*, about 1850; Mts. above Sija (Totonicapam), *O. F. Cook* 33, May 24, 1906 (U.S., ♂ fls.); Cumbre del Aire, Dept. Totonicapam, alt. 10000 ft., *A. F. Skutch* 1279, Sept. 20, 1934 (sterile); Las Cumbres de Totonicapam, alt. 11000 ft., *J. H. Faull*, Dec. 25, 1936 (sterile); Las Cumbres del Aire, between Quezaltenango and Huehuetenango, alt. 11000 ft., *J. H. Faull*, Dec. 31, 1936 (A.A. with immature cones); Las Cumbres del Aire,

<sup>1</sup>Mateo Botteri collected 1193 numbers in southern Mexico about the year 1855, (see Bonplandia, 5: 72. 1857).



Huehuetenango, elev. 10000 ft., *J. H. Faull 13104*, Dec. 14, 1937 (type in A.A. with cones).

This species is readily distinguished from *A. religiosa* by the emarginate and pectinately arranged leaves, and from both preceding species by the bracts being only half as long as the scales, truncate at the apex and entirely hidden between the scales. In the pectinately arranged leaves and in their emarginate apex, it agrees with *A. Hickeli*, but differs from it in the broadly obovate bracts truncate at the apex and only about half as long as the scale, and in the leaves having only two resin canals. Both species, *A. Hickeli* and *A. guatemalensis* are easily distinguished, even without cones, from *A. religiosa* by the pectinately spreading emarginate leaves, while in the latter they are on the upper surface of the branch, directed forward and more or less appressed to the branch and always acute or obtusish at the apex, never emarginate.

*Abies guatemalensis*, which so far is known only from a restricted area near Lake Atitlan in the high mountain range along the western coast of Guatemala, marks the southernmost extension of the range of the whole genus, occurring as it does, between 14° and 15° N. lat., while in Asia and Africa, it does not even reach the Tropic of Cancer. The Guatemalan species seems to have been collected first by George U. Skinner<sup>1</sup> who sent a specimen from Guatemala to J. D. Hooker before 1866, which is cited by Parlatore under *Pinus religiosa* (l. c.).

The references to the occurrence of *Abies religiosa* in Guatemala by later authors are probably all based on this citation. Skinner's specimen in the Kew Herbarium which was kindly sent to me for examination, bears on the sheet besides *A. religiosa* on the original label, also the name *A. hirtella* and annotations by several authors, all doubting the identity of the specimen with *A. religiosa*. A note by J. D. Hooker says "leaves notched at apex" and a similar statement is made in an unsigned note. A note by Wm. R. McNab states that "this differs from *religiosa* in having only a few large hypoderm cells under the epidermis. I believe therefore that *hirtella* is distinct from *religiosa*." There are references by McNab to this specimen in a paper of his in *Proc. Roy. Irish Acad.* II, 2: 676 (1877) and in *Trans. Scott. Arb.* 8: 97 (1878). There is also a note "not religiosa, Dr. Mayr." These notes may have induced Hemsley to enumerate it as *Abies* sp. n. ? (l. c.). More recently, in 1934, it was again collected by A. F. Skutch, but also without cones. The real nature of the Guatemalan fir was not recognized until Dr. J. H. Faull collected for the Arnold Arboretum in 1936 excellent

<sup>1</sup>For a biographical sketch see *Trans. Soc. Bot. Edinb.* 9: 91-99 (1868) and *Gard. Chron.* 1867: 180-181.

material with mature cones which enabled us to recognize this fir as a new species.

**Abies concolor** (Gord.) Engelm. in Trans. St. Louis Acad. Sci. 3: 600 (Syn. Am. Firs) (1878); repr. p. 8 (1878); in Trelease & Gray, Bot. Works Engelm. 345 (1887).

*Abies concolor* Lindley & Gordon in Jour. Hort. Soc. Lond. 5: 210 (1850), nom. nud.

*Pinus concolor* Engelm. ex Lindley & Gordon, l. c. (1850), pro synonym. praeced.

*Picea concolor* Gordon, Pinet 155 (1858).

*Pinus concolor* Engelm. herb. ex Parlatores, in DC. Prodr. 16<sup>2</sup>: 426 (1868).

*Abies grandis* var. *concolor* A. Murray in Gard. Chron. n. ser. 3: 105 (1875).

MEXICO. Lower California: San Pedro Martir, T. S. Brandegee, May 24, 1893 (A.A.); Vallecitos, Sierra San Pedro Martir, alt. 8060 ft., I. L. Wiggins & D. Demaree 4979, Sept. 21, 1930; trees mostly less than 10 ft. tall (G.H.).

This species is widely distributed throughout the Rocky Mountain region from Colorado to Oregon, south to New Mexico and southern California, but in Mexico it has been found only in northern Lower California on the San Pedro Martir Mountain where it was discovered in 1893 by T. S. Brandegee (cf. Zoe, 4: 210. 1893); the specimens from the San Pedro Martir Mountain differ from typical *A. concolor* in the leaves being more or less curved, thicker, and only 1.5–3 cm. long.

As authors of the name *A. concolor* usually Lindley and Gordon are cited, but they published no description and only cited the unpublished *Pinus concolor* Engelm. as a synonym. The first, though rather brief description is given by Gordon under *Picea concolor*; he only says: "Leaves, long, linear, flat and much resembling those of *Picea grandis* but with both faces of the leaves of the same colour. Cones, cylindrical." Should this not be considered a sufficient description, the parenthetical author would be Parlatores.

HERBARIUM, ARNOLD ARBORETUM,  
HARVARD UNIVERSITY.

PLANTAE KRUKOVIANAE VI<sup>1</sup>

A. C. SMITH

THE PRESENT PAPER is based primarily upon plants collected in Amazonian Brazil by Mr. B. A. Krukoff. The first set of his collections, including the types of new species here described, is deposited in the herbarium of the New York Botanical Garden. The first set of duplicates is deposited at Harvard University (woody plants at the Arnold Arboretum, herbaceous plants at the Gray Herbarium). Other duplicate sets are widely distributed in American and European institutions.

## ARACEAE

**Philodendron amplexans** A. C. Smith, sp. nov.

Planta epiphytica scandens; caudice gracili verruculis minutis asperato, 4–8 mm. crasso, ad nodos radicante, internodiis elongatis 18–22 cm. longis; petiolis supra leviter canaliculatis siccitate striatis, verruculis minutis densissime obtectis, basi vagina decidua circiter 2 cm. longa instructis, 7–11 cm. longis; laminis coriaceis anguste oblongo-deltoidesagittatis, 11–15 cm. longis, basi 5.5–7.5 cm. latis, apice breviter acuminatis, lobis posticis oblongis apice rotundatis circiter 4 cm. longis et 2.5 cm. latis sinu lato parabolico sejunctis, nervis lateralibus primariis costalibus quam secundariis atque tertiariis vix crassioribus, basalibus 2 paullo validioribus, nervo colectivo a margine circiter 1 mm. remoto; pedunculo tereti 4–4.5 cm. longo; spatha ovato-oblonga medio leviter constricta, 9.5–10 cm. longa, expansa 4–5.5 cm. lata, convoluta 1.5–2 cm. diametro, apice breviter apiculata; spadice conspicue stipitato (stipite circiter 15 mm. longo et 4 mm. diametro) quam spatha paullo brevior, inflorescentia feminea circiter 2.5 cm. longa, 6–8 mm. crassa, mascula 4–4.5 cm. longa apice obtusa; pistillo subcylindrico circiter 3 mm. longo et 1.5 mm. diametro, 3- vel 4-loculari, multiovulato, stigmatibus truncato coronato; floribus masculis 3- vel 4-andris, circiter 2 mm. longis.

Type, *Krukoff* 7250, collected Nov. 15, 1934, on margin of Rio IPIXUNA between Monte Christo and Santa Victoria, Municipality Humayta,

<sup>1</sup>Previous papers in this series have been published as follows:

- I: Bull. Torrey Club 60: 349–365, 379–396. *pl.* 21, 22. 1933.
- II: Bull. Torrey Club 61: 191–196. 1934.
- III: (by H. A. GLEASON): Phytologia 1: 106–111. 1934.
- IV: Phytologia 1: 113–126. 1935.
- V: Brittonia 2: 145–164. 1936.



basin of Rio Madeira, Amazonas. A species of Engler's Section POLYSPERMUM, it is related to *P. Jenmanii* Krause and *P. scabrum* Krause, particularly resembling the latter by its scabrid petiole. Than either of these species, however, *P. amplexans* has a much narrower leaf blade and a longer inflorescence stipe. *Philodendron scabrum* has a comparatively short spadix and the pistil is described as several-loculed.

***Philodendron solimoesensis* A. C. Smith, sp. nov.**

Planta epiphytica; petiolis siccitate valde striatis basi teretibus apicem versus supra leviter canaliculatis, circiter 45 cm. longis, inferne 6–7 mm. diametro; laminis coriaceis oblongo-sagittatis, 40–55 cm. longis, basin versus 20–23 cm. latis, lobis posticis triangulari-oblongis sinu profundo acuto distantibus, 19–20 cm. longis, ad 12 cm. latis, apice obtusis, lobo antico oblongo-triangulari apice obtusis, nervis lateralibus primariis utroque circiter 4 a costa patentibus quam secundariis atque tertiariis multo validioribus, basalibus 2 in costulas in sinu longe (3–4 cm.) denudatas conjunctis, nervis secundariis et tertiariis prominulis in nervum collectivum a margine circiter 0.5 mm. remotum conjunctis; pedunculo 5–6 mm. crasso ut videtur brevi; spatha siccitate coriacea apice acuta medio leviter constricta, circiter 20 cm. longa, convoluta 2.5–4 cm. diametro; spadice stipite brevi suffulto, inflorescentia feminea circiter 8 cm. longa et 2–2.5 cm. diametro, mascula circiter 8 cm. longa et 1.5 cm. diametro, apice obtusa; baccis subcylindricis, 7–9 mm. longis, 5–6 mm. diametro, 5-locularibus, stigmatibus subrotundatis coronatis.

Type, *Krukoff 8861*, collected Oct.–Dec., 1936, on terra firma in basin of Creek Belem, Municipality São Paulo de Olivença, basin of Rio Solimoes, Amazonas. A species of Engler's Section POLYSPERMUM, it is remarkable for the elongate-triangular basal lobes of its sagittate leaves. From *P. maculatum* Krause, a near ally, the new species differs in foliage and also in its substantially larger inflorescence.

***Heteropsis linearis* A. C. Smith, sp. nov.**

Caudex alte scandens; ramulis crassis striatis nigrescentibus 3–5 mm. crassis, teretibus vel apicem versus paullo complanatis, internodiis 2–4 cm. longis; petiolis 1.5–2 mm. crassis striatis supra canaliculatis 3–7 mm. longis; laminis rigide coriaceis linearibus vel angustissime oblongis saepe falcatis, 15–22 cm. longis, 1.8–2 cm. latis, basi attenuatis, apice acutis vel calloso-apiculatis, margine crassis et leviter recurvatis, nervis lateralibus numerosis valde adscendentibus utrinque distincte prominulis prope marginem conjunctis; ramulis floriferis brevibus terminalibus; pedunculo tereti conspicue striato 8–10 mm. longo; spatha non visa; spadice (stipite 6–7 mm. longo suffulto) in siccitate nigrescente oblongo, florifero circiter

35 mm. longo et 7 mm. diametro, apice obtuso; pistillo vertice 3–5 mm. lato, stigmatе oblongo instructo.

Type, *Krukoff 8781*, collected Oct.–Dec., 1936, in high forest on terra firma in basin of Creek Belem, Municipality São Paulo de Olivença, basin of Rio Solimoes, Amazonas. It is a very distinct species on the basis of its long and extremely narrow leaves. *Heteropsis rigidifolia* Engl., apparently the closest relative of the new species, has leaves not exceeding 15 cm. in length and not less than 2.5 cm. broad, as well as a shorter spadix.

***Heteropsis macrophylla* A. C. Smith, sp. nov.**

Caudex alte scandens; ramulis crassis 4–8 mm. diametro striatis nigrescentibus teretibus, internodiis 2–4 cm. longis; petiolis 3–4 mm. crassis striatis profunde canaliculatis 9–12 mm. longis; laminis rigide coriaceis anguste oblongis, 18–30 cm. longis, 5–7 cm. latis, supra nitidis, basi obtusis, apice obtusis vel breviter cuspidatis, margine leviter undulatis, nervis lateralibus numerosis rectis adscendentibus utrinque prominulis in nervum collectivum a margine circiter 0.5 mm. remotum conjunctis; ramulis floriferis axillaribus circiter 8 cm. longis; pedunculo crasso tereti striato 12–20 mm. longo; spatha non visa; spadice (stipite brevi suffulto) oblongo, florifero 5–6 cm. longo et medio 1–1.3 cm. diametro, apice obtuso; pistillo vertice 3–5 mm. lato, stigmatе punctiformi coronato.

Type, *Krukoff 7151*, collected Nov. 11, 1934, on terra firma on the plateau between Rio Livramento and Rio Ipixuna, Municipality Humayta, basin of Rio Madeira, Amazonas. It is a species characterized by fine coriaceous shining leaves, the largest so far reported for the genus. From *H. Jenmani* Oliv., apparently its closest ally, the new species differs by having its leaves less gradually narrowed at the extremities and lacking an acuminate tip, and by having a very regular collecting nerve extremely close to the leaf margin.

SMILACACEAE

***Smilax Krukovii* A. C. Smith, sp. nov.**

Frutex scandens ubique glaber ut videtur inermis; ramulis teretibus gracilibus; petiolis gracilibus saepe tortuosis 10–17 mm. longis, vetustioribus basi prope ad medium anguste vaginatis, vaginis valde apiculatis; laminis chartaceo-coriaceis opacis supra nitidis lanceolato- vel ovato-oblongis, 10–12 cm. longis, 3.5–5.7 cm. latis, basi cuneato-attenuatis, apice breviter apiculato-acuminatis, margine integris undulatis, 5-nerviis, nervis extimis marginalibus et inconspicuis, nervis alteris supra pro-



minulis subtus prominentibus, venulis reticulatis utrinque prominulis; pedunculis masculis solitariis quam petiolis multo brevioribus, 3–5 mm. longis; receptaculis globosis circiter 4 mm. diametro, bracteolis coriaceis minutis ovatis; pedicellis gracilibus 3–4 mm. longis; floribus ut videtur 18–25 per inflorescentiam, alabastris 3–3.5 mm. longis; perianthii segmentis oblongis apice incurvatis, exterioribus circiter 1.5 mm. latis, interioribus paullo angustioribus; filamentis brevissimis (ad 0.5 mm. longis), antheris oblongis obtusis circiter 2 mm. longis.

Type, *Krukoff 8964*, collected Oct.–Dec., 1936, on shore of creek, basin of Creek Belem, Municipality São Paulo de Olivença, basin of Rio Solimoes, Amazonas. It is a species related to *S. eucalyptifolia* Kunth and its allies, differing from them by its short peduncles, smaller receptacles, and smaller flowers. From *S. gilva* Macbride of adjacent Peru, which it closely resembles in foliage, the new species differs by its globose rather than elongate receptacles, its shorter pedicels, and its somewhat smaller flowers with proportionately shorter filaments.

***Smilax graciliflora* A. C. Smith, sp. nov.**

Frutex scandens ubique glaber; ramulis teretibus parce tuberculatis 2.5–4 mm. crassis, aculeis paucis recurvis 2–5 mm. longis armatis; petiolis 15–40 mm. longis, usque ad  $\frac{1}{3}$  marginibus inflexis extremitate ut videtur decidue cirrhiferis vaginatis; laminis valde coriaceis opacis anguste ovato-oblongis, 20–27 cm. longis, 6.5–10.5 cm. latis, basi obtuso-attenuatis, apice breviter acuminatis (acumine obtuso 1–1.5 cm. longo), margine integris, 5-nerviis, nervis extimis marginalibus et inconspicuis, nervis alteris supra conspicue impressa subtus prominentibus, venulis reticulatis supra obscuris vel leviter elevatis subtus prominulis; squamis basi ramorum coriaceis ovato-oblongis ad 1 cm. longis; racemis axillariibus ad 13 cm. longis; pedunculis masculis in axillis bractearum oblongarum 6–10 mm. longarum gracilibus 15–30 mm. longis; receptaculis subglobosis 2–3 mm. diametro, bracteolis oblongo-lanceolatis 0.5–1 mm. longis; umbellis masculis 30–60-floris; pedicellis gracilibus 5–8 mm. longis; perianthii segmentis anguste oblongis, exterioribus circiter 5 mm. longis et 1.3–1.5 mm. latis, interioribus paullo minoribus vel similibus; filamentis brevissimis (0.5 mm. longis), antheris oblongis obtusis 2–2.6 mm. longis, dorso squamis minutis argenteis oblongis circiter 0.1 mm. longis copiose lineolatis.

Type, *Krukoff 8806*, collected Oct.–Dec., 1936, in high forest on terra firma, basin of Creek Belem, Municipality São Paulo de Olivença, basin of Rio Solimoes, Amazonas. It is a species characterized by its large coriaceous leaves with the primary nerves impressed above, its slender

peduncles and pedicels, its many-flowered umbels, and its dorsally silver-lineolate anthers. Its relationship is with *S. cinnamomea* Desf. and its allies.

#### MENISPERMACEAE

##### **Odontocarya tripetala** Diels

COLOMBIA. B o y a c á : Mt. Chapon Region, *Lawrance* 302 (type coll.). BRAZIL. A m a z o n a s : Municipality São Paulo de Olivença, near Palmares, basin of Rio Solimoes, *Krukoff* 8182. BOLIVIA. B e n i : Rurrenabaque, *Cardenas* 1873.

The above cited collections indicate the wide distribution which is frequent in Menispermaceae. Dissections of staminate flowers show that the anthers are transversely dehiscent, a character which seems to remove the species from *Odontocarya*. Three petals are also not found elsewhere in the genus. The inflorescence branching suggests *Somphoxylon*, but here also, as in the related *Synandropus*, the anthers are vertically dehiscent. For the time being, Diels' placing of the species is accepted, but future revision of these genera will probably make a separation necessary.

##### **Somphoxylon magnifolium** A. C. Smith, sp. nov.

Frutex scandens; ramulis teretibus striatis; petiolis glabris striatis gracilibus (circiter 1.5 mm. crassis) 4–6 cm. longis, basi et apice in-crassatis; laminis chartaceis vel papyraceis glabris plus minusve trans-lucidis elliptico-oblongis, 25–28 cm. longis, 11–12 cm. latis, basi rotun-datis vel obtuso-rotundatis, apice breviter acuminatis (acumine 7–9 mm. longo apiculato), margine integris, nervis lateralibus 7 vel 8 arcuato-adscententibus cum costa supra elevatis subtus prominentibus, venulis copiose et arcte reticulatis utrinque prominulis; inflorescentiis masculis perfectis non visis, ramulis minutissime puberulis demum glabris, ramulis primariis gracilibus 7–8 cm. longis, ramulis secundariis 4–8 mm. longis; floribus plerumque solitariis, bracteis ovatis minutis ad 0.5 mm. longis subtentis, breviter pedicellatis vel sessilibus; sepalis 3 exterioribus del-toideis obtusis circiter 0.5 mm. longis et latis, 3 interioribus membrana-ceis suborbicularibus valde concavis circiter 1 mm. longis et latis; petalis 6 subobovatis vel obcuneatis, circiter 0.8 mm. longis, 0.3–0.5 mm. latis, marginibus inflexis; staminibus 3 circiter 0.6 mm. longis, filamentis connatis, antheris filamenta aequantibus per rimas verticales dehiscen-tibus.

Type, *Krukoff* 7035, collected Nov. 6, 1934, on terra firma, along Rio Livramento, Municipality Humayta, basin of Rio Madeira, Ama-zonas. Among the three species recognized to date, *S. magnifolium* most



nearly resembles in leaf shape and venation *S. Klugii* A. C. Smith, a species with much smaller leaves, with more ample inflorescences as evinced by the secondary branches being 2.5–4 cm. long, and with larger flowers. From *S. Wulschlaegelii* Eichl. the new species differs by having its leaves proportionately narrower, its inflorescence apparently more compact, and its flowers conspicuously smaller. The leaf blades of *S. Wulschlaegelii* are 5-nerved from the base, or at least the basal pair of nerves has conspicuous proximal branches; *S. magnifolium* has leaf blades simply 3-nerved from the base.

#### MONIMIACEAE

##### **Siparuna pachyantha** A. C. Smith, sp. nov.

Arbor monoecia ad 20 m. alta, trunco 12–18 cm. diametro; ramulis crassis rugulosis fuscis juventute arcte et densissime lepidoto-tomentellis demum glabris; foliis ramulorum prope apices confertis; petiolis crassis valde canaliculatis 1.5–3.5 cm. longis, ut ramulis novellis tomentellis; laminis chartaceis siccitate fuscis obovato-ellipticis vel elliptico-oblongis, 21–36 cm. longis, 11–15 cm. latis, basi longe attenuatis, apice ut videtur breviter cuspidatis, margine undulatis et leviter revolutis, utrinque praecipue ad nervos stellato-lepidoto-pilosis demum glabrescentibus, pinnatinerviis, costa valida subtus prominente, nervis secundariis utroque 15–17 rectis patulis prope margines conspicue anastomosantibus supra leviter elevatis subtus prominentibus, venulis utrinque prominulis; inflorescentiis axillaribus cymosis plerumque binis 2–6.5 cm. longis, ramulis (cum floribus) densissime stellato-lepidoto-tomentellis; floribus sessilibus vel senectute breviter (ad 2 mm.) pedicellatis, magnitudine valde diversis, obovoideo-globosis, masculis 1.5–3.5 mm. diametro, bracteis 2 vel 3 lineari-oblongis 1–1.5 mm. longis subtentis; receptaculo valde carnoso; tepalis obsoletis; velo leviter conico-elevato, ore minuto; staminibus 2 deltoideis carnosius 0.5–0.8 mm. longis, basi 0.6–0.8 mm. latis, antheris quam filamentis longioribus, per poros ovales contiguos 0.3–0.5 mm. longos dehiscentibus; floribus femineis depresso-globosis quam masculis majoribus ad 4.5 mm. latis; stylis 6–10 ut videtur leviter cohaerentibus non exsertis.

Type, *Krukoff 8674*, collected Oct.–Dec., 1936, in high forest on terra firma in basin of Creek Belem, Municipality São Paulo de Olivença, basin of Rio Solimoes, Amazonas. Another collection from the same region is *Krukoff 8667*. Pistillate flowers are very few and appear to be confined to the lower parts of the inflorescence (or lacking on most inflorescences). In the treatment of Perkins and Gilg in the *Pflanzenreich*, the new species should be sought near *S. cristata* (P. & E.) A. DC.,

*S. lepidantha* Perk., and *S. sarmentosa* Perk., but actually it is not very closely related to these, appearing to have no near allies, at least in low-land South America. The thick flowers with only 2 stamens (a constant character in the many flowers examined), the lack of tepals, and the large attenuate-based leaves place the species in an isolated position in the genus.

#### CELASTRACEAE

##### **Maytenus Krukovii** A. C. Smith, sp. nov.

Arbor glabra ad 28 m. alta; ramulis teretibus (vel juventute leviter complanatis) gracilibus mox cinereis; petiolis rugosis anguste alatis vel conspicue canaliculatis 6–9 mm. longis; laminis coriaceis siccitate olivaceis vel fuscis oblongo-ellipticis vel obovato-ellipticis, 9–14 (–18) cm. longis, 3.5–5 (–7) cm. latis, basi attenuatis et in petiolum decurrentibus, apice acuminatis (acumine ad 10 mm. longo ut videtur obtuso), margine leviter revolutis et superne obscure crenato-serratis, costa utrinque prominente, nervis lateralibus utroque 7–9 adscendentibus prope margines anastomosantibus supra immersis et obscuris subtus leviter prominulis, venulis obscuris; inflorescentiis axillaribus glomerulatis 4–5 mm. diametro; floribus sessilibus vel subsessilibus (pedicellis ad 0.5 mm. longis) numerosissimis (50 vel ultra per inflorescentiam), bracteis minutis; calyce cupuliformi, sepalis deltoideis subacutis, 0.8–1 mm. longis, circiter 0.6 mm. latis, apicem versus minute glanduloso-fimbriatis; petalis imbricatis oblongo-deltoideis, 0.8–1.2 mm. longis, circiter 0.8 mm. latis, apice obtusis vel rotundatis; filamentis minutis 0.2 mm. longis apice angustatis; antheris deltoideo-ovoideis, circiter 0.5 mm. longis et latis, basi profunde cordatis, apice minute mucronulatis; disco carnoso circiter 1.2 mm. diametro margine undulato; ovario in disco immerso, stylo crasso circiter 0.4 mm. longo inconspicue lobato; capsula oblongo-obovoidea coriacea, circiter 20 mm. longa et 14 mm. lata, valvis 2, pericarpio 1–1.5 mm. crasso.

Type, *Krukoff* 4957, collected June 21, 1933, on terra firma near mouth of Rio Embira (tributary of Rio Tarauaca), basin of Rio Jurua, Amazonas. Other collections are: between Rio Madeira and Rio Capana, *Krukoff* 7310, 7311. The type is in flower; 7310 is accompanied by a single imperfect fruit; 7311 is sterile. There is little doubt that the specimens are conspecific, although 7311 has slightly larger leaves than the other two.

*Maytenus Krukovii* closely resembles *M. laurina* Briq. of the Rio Negro in leaf shape and texture, but differs by having its smooth upper leaf surfaces with immersed nerves, while *M. laurina* has the nerves and veinlets sharply impressed above. The inflorescence of *M. laurina*,



although congested, is not strictly glomerulate as that of the new species. *Maytenus Krukovii* also resembles *M. Radlkoferiana* Loes., but differs by having its leaves less conspicuously serrulate and its flowers much more numerous and essentially sessile.

The collector states that this is probably the same species known in Peru as "chuchuhuasca," mentioned by LeCointe.<sup>1</sup> The bark is considered a powerful stimulant and yields an alkaloid similar to cathin, from the leaves of *Catha edulis* Forsk.

***Maytenus micrantha* A. C. Smith, sp. nov.**

Arbor glabra ad 25 m. alta; ramulis patulis subteretibus gracilibus juventute fuscis mox cinereis; petiolis rugosis anguste alatis vel supra complanatis 5–9 mm. longis; laminis coriaceis vel crasse chartaceis siccitate olivaceo-fuscis oblongis vel oblongo-ellipticis, 7–11 cm. longis, 2.3–4.5 cm. latis, basi obtusis et in petiolum decurrentibus, apice ut videtur obtuse acuminatis, margine leviter revolutis et superne obscure crenatis, costa utrinque prominente, nervis lateralibus utroque 10–12 patulis prope margines adscendentibus utrinque manifeste elevatis, venulis utrinque minute prominulis vel obscuris; inflorescentiis axillariibus fasciculatis 3–5 mm. diametro; floribus subsessilibus (pedicellis sub anthesi 0.5–0.7 mm. longis) numerosissimis; bracteis oblongis circiter 0.8 mm. longis, apicem versus fimbriatis; sepalis imbricatis late deltoideis obtusis, circiter 0.6 mm. longis, 0.8–1 mm. latis; petalis imbricatis oblongis obtusis circiter 0.7 mm. longis et latis; filamentis minutis, antheris globoso-deltoideis circiter 0.3 mm. diametro; disco carnosio circiter 0.7 mm. diametro; ovario in disco immerso, stylo crasso circiter 0.3 mm. longo minute lobato.

Type, *Krukoff 6596*, collected Oct. 13, 1934, on terra firma near Livramento, on Rio Livramento, basin of Rio Madeira, Amazonas. It is a species characterized by compact inflorescences and extremely small flowers, closely resembling the preceding (*M. Krukovii*) in inflorescence characters, but differing by its somewhat smaller leaves which are thinner in texture and with spreading lateral nerves obvious on both surfaces. From another allied species which it resembles in leaf shape, *M. ebenifolia* Reiss., the new species differs by having its lateral nerves raised rather than impressed above and by its subsessile smaller flowers.

OCHNACEAE

***Krukoviella* A. C. Smith, gen. nov.**

Flores magni 5-meri. Sepala imbricata, 2 exteriora quam interiora

<sup>1</sup>LeCointe, P. *Arbores e plantas uteis*, 120. 1934 (Para).

paullo minora. Petala lutea imbricata. Staminodia nulla. Stamina 10 uniseriata ovarium cingentia non secunda; filamentis brevibus ligulatis; antheris erectis, loculis 2 per porum unicum terminalem dehiscentibus. Ovarium fusiforme; placentis 5 fere ad ovarii centrum valde intrusis, hic bifurcatis retroflexis; ovulis numerosissimis in 10 cumulis linearibus arcte imbricatis, uno margine et apice angustissime membranaceo-alatis. Stylus subnullus. Stigmata 5 sessilia minuta linearia radiatim adnata.

Frutex scandens. Folia alternata simplicia; nervis secundariis pinnatis paucis; nervis tertiariis et venulis aequabiliter reticulatis. Stipulae mox caducae, cicatricibus marginibus superioribus ciliatis. Inflorescentiae terminales paniculatae.

The new genus is named in honor of Mr. B. A. Krukoff, in recognition of the value of the thousands of specimens he has collected in Amazonian Brazil in recent years.

*Krukoviella* is quite unique in the Ochnaceae because of its lack of the subulate style characteristic of the family and its 5 radiating sessile stigmas, which suggest certain genera of Guttiferae. It falls into the Tribe Luxemburgieae, in which, because of the absence of staminodes as well as in inflorescence and foliage characters, it can be related only to *Cespedesia* Goudot and *Godoya* R. & P., being especially close to the latter. In addition to the stigmatic differences, *Krukoviella* differs from *Godoya* as follows: sepals glabrous rather than ciliate at base within; petals bilobed at anthesis rather than entire; stamens in one row rather than two; anthers with a single terminal pore rather than two; placentae parietal rather than axillary. The new plant is said by the collector to be a liana; it has the tertiary nerves hardly distinguishable from the copiously reticulate veinlets and not conspicuously parallel. The species of *Godoya*, on the other hand, are trees; they have the tertiary nerves more or less parallel and usually distinguishable from the veinlets. The stamens of the new genus, in young flowers, are regularly disposed about the ovary, and even at anthesis there is no intimation of zygomorphy as in *Godoya* and its other allies, which have the ovary and stamens divergently secund.

***Krukoviella scandens*** A. C. Smith, sp. nov.

Frutex scandens ubique glaber; ramulis teretibus striatis fusco-cinereis parce lenticellatis; stipulis coriaceis oblongis vel oblongo-obovatis ad 7 mm. longis et 5 mm. latis, apice rotundatis, basi latis, cicatricibus cilia nigra ad 1 mm. longa marginibus superioribus gerentibus; petiolis rugosis supra subplanis 4–7 mm. longis, superne anguste



alatis; laminis coriaceis siccitate supra olivaceis subtus fuscis obovatis, 7–14 cm. longis, 3–6.5 cm. latis, basi acutis vel attenuatis, apice rotundatis et minute mucronulatis vel leviter emarginatis, margine revolutis et crenato-dentatis (dentibus inconspicuis 3–6 per centimetrum), costa utrinque valde prominente, nervis secundariis utroque 14–18 patulis leviter curvatis conspicuis utrinque valde prominulis, nervis tertiariis et venulis copiose reticulatis utrinque prominulis; inflorescentiis sub anthesi ad 18 cm. longis et 10 cm. latis, pedunculo ad 4 cm. longo cum rhachi tereti striato recto, ramulis secundariis alternatis patulis infra nodos saepe complanatis; floribus numerosis, pedicellis gracilibus sub anthesi 6–8 mm. longis superne leviter incrassatis; sepalis coriaceis erectis concavis ovatis vel ovato-oblongis, 2 exterioribus 3–4 mm. longis et circiter 3 mm. latis, 3 interioribus 4–5 mm. longis et 3–4 mm. latis, apice rotundatis, margine integris, basi leviter auriculatis; petalis tenuiter coriaceis obovatis vel obdeltoideis, 10–13 mm. longis, 6–8 mm. latis, juventute integris, sub anthesi apice bilobatis (sinu ad 5 mm. alto, lobis rotundatis), basi ad 1 mm. angustatis, margine apicem versus anguste involutis; filamentis carnosis, 1.5–1.8 mm. longis, basi circiter 0.5 mm. latis, apice leviter incrassatis; antheris mox caducis lineari-oblongis, 4–5 mm. longis, circiter 1.3 mm. latis, basi truncatis vel leviter auriculatis, apice obtuse cuspidatis, apiculo circiter 0.3 mm. longo, poro minuto; ovario verruculoso leviter 5-sulcato breviter stipitato, sub anthesi 7–9 mm. longo, medio circiter 2 mm. diametro, basi et apice angustato, apice subacuto; stigmatibus albis circiter 0.2 mm. longis.

Type, *Krukoff 8908*, collected Oct.–Dec., 1936, on terra firma in high forest, basin of Creek Belem, Municipality São Paulo de Olivença, Amazonas.

#### CARYOCARACEAE

##### ***Caryocar pallidum* A. C. Smith, sp. nov.**

Arbor ad 25–35 m. alta ubique glabra; ramulis robustis teretibus fusco-cinereis, cicatricibus stipularum mox delapsarum inconspicuis; petiolis teretibus striatis (2–) 5–11 cm. longis; stipellis plerumque 2 conspicuis curvatis 4–9 mm. longis saepe persistentibus; petiolulis supra subplanis subaequalibus gracilibus 4–10 mm. longis; laminis chartaceis vel tenuiter coriaceis siccitate fuscis subaequalibus (terminalibus paullo maximis, lateralibus saepe basi inaequilateralibus) ellipticis, 7–15 cm. longis, 3.5–6.5 cm. latis, basi acutis vel obtusis, apice obtuse cuspidatis (acumine 5–10 mm. longo), margine cartilagineis et conspicue serratis (serraturis 2–3 per centimetrum apice obtusis vel inconspicue apiculatis), costa supra acute elevata subtus prominente, nervis lateralibus

utroque 8–12 adscendentibus prope margines anastomosantibus supra subplanis subtus prominulis, venulis copiose reticulatis supra saepe leviter impressis subtus subplanis; pedunculis crassis 8–10 cm. longis; racemis 15–25-floris, rhachi 3–4 cm. longa copiose lenticellata; pedicellis adscendentibus siccitate valde striatis sub anthesi 15–35 mm. longis, prophyllis nullis; calyce 5–7 mm. longo et summo 9–12 mm. diametro, basi in stipitem crassum 3–5 mm. longum abrupte contracto, lobis 5 deltoideo-ovatis obtusis 4–5 mm. longis et 5–6 mm. latis; petalis et filamentis albis vel flavescentibus; petalis sub anthesi obovato-oblongis, 15–23 mm. longis, 8–13 mm. latis, apice rotundatis et saepe concavis, basi paullo angustatis, margine minutissime serrulatis; staminibus numerosissimis, filamentis filiformibus 2–3 cm. longis, basi in annulum 2–4 mm. longum conatis.

Type, *Krukoff 7011*, collected Nov. 2–19, 1934, on terra firma on the plateau between Rio Livramento and Rio Ipixuna, basin of Rio Madeira, Amazonas. Another collection is: Amazonas: basin of Rio Purus: San Carlos, about 100 miles above Labrea, on terra firma, *Krukoff 5824*. The new species is characterized by its comparatively small white or yellowish flowers, including the filaments, and its glabrous coarsely serrate leaflets with fine reticulate venation. In foliage characters, it closely resembles *C. crenatum* Wittm., from which it differs by the absence of tufted hairs in the axils of secondary nerves, by the absence of pedicellary bractlets, and by its fewer-flowered racemes. *Caryocar dentatum* Gleason, another species with dentate leaflets, has conspicuous pubescence on the petioles, petiolules, lower surfaces of leaflet blades, pedicels, and calyx, and has conspicuously longer filaments. The flower color of neither *C. crenatum* nor *C. dentatum* has been recorded. The Peruvian *C. Tessmannii* Pilger, somewhat similar in general appearance to *C. pallidum*, has scarlet filaments, less distinctly serrate leaflet margins, axillary hair tufts on the lower surfaces of leaflet blades, and no stipels.

***Caryocar parviflorum* A. C. Smith, sp. nov.**

Arbor nobilis ad 45–55 m. alta ubique glabra; ramulis robustis teretibus fuscis saepe lenticellatis, cicatricibus stipularum mox delapsarum inconspicuis; petiolis subteretibus vel apicem versus plus minusve complanatis striatis 2–6 cm. longis; stipellis plerumque 2 involutis curvatis 2–3 mm. longis plerumque persistentibus; petiolulis subaequalibus leviter canaliculatis 3–10 mm. longis; laminis tenuiter coriaceis vel chartaceis siccitate fusco-olivaceis subaequalibus ellipticis vel obovato-ellipticis, 5–9 cm. longis, 2.5–5 cm. latis, basi acutis vel cuneatis (lateralibus paullo

inaequilateralibus), apice obtuse cuspidatis (acumine 2–7 mm. longo saepe calloso-mucronulato), margine cartilagineis subintegris vel undulatis vel remote et inconspicue crenatis, costa supra leviter elevata subtus prominente, nervis lateralibus utroque 8–11 patulis prope margines anastomosantibus utrinque prominulis, venulis copiose reticulatis supra saepe leviter prominulis; pedunculis crassis 5–6 cm. longis; racemis 10–25-floris, rhachi 2–5.5 cm. longa lenticellata; pedicellis siccitate valde striatis sub anthesi 10–20 mm. longis, prophyllis nullis; calyce 4–5 mm. longo et summo 9–11 mm. diametro, basi in stipitem crassum 1–2 mm. longum abrupte contracto, lobis 5 semiorbicularibus circiter 3 mm. longis et 3–5 mm. latis; petalis sub anthesi obovatis, 18–25 mm. longis, 11–13 mm. latis, apice rotundatis, basi angustatis, margine minute erosis; staminibus numerosissimis, filamentis exterioribus coccineis 27–33 mm. longis, basi in annulum brevem connatis, interioribus brevioribus moniliformibus flavescentibus, antheris oblongis ad 0.5 mm. longis; stylis flavescentibus filamentis exterioribus subaequalibus.

Type, *Krukoff 6599*, collected Oct. 13, 1934, on terra firma near Livramento, on Rio Livramento, Municipality Humayta, basin of Rio Madeira, Amazonas. Another collection from the same general region is *Krukoff 6438*, from restinga alta near Tres Casas. A local name is "Piquiarana," which is elsewhere used to designate *C. glabrum* (Aubl.) Pers. Like *C. glabrum*, its closest relative, *C. parviflorum* is a tree of the high forest above flood-level with red or scarlet outer filaments. It may be distinguished from that widespread species primarily by its smaller flowers, of which the outer filaments of fully mature and fallen flowers hardly exceed 3 cm. in length, those of *C. glabrum* usually being about 6 cm. long. The leaflets of the new species appear to be somewhat smaller on the average, more obovate in outline, and more consistently entire than those of *C. glabrum*, and the stipels are more persistent. It is quite likely that future collection of the fruits or nuts will give additional characters to separate the two plants, since in the genus as a whole the fruits provide very reliable characters.

#### GUTTIFERAE

##### ***Vismia cauliflora* A. C. Smith, sp. nov.**

Frutex vel arbor gracilis ad 8 m. alta; ramulis crassis teretibus juventute dense rufo- vel ferrugineo-tomentosis mox glabrescentibus et cinereis; petiolis crassis (4–6 mm. diametro) 3–15 mm. longis ut ramulis densissime tomentosis; laminis coriaceis anguste obovato-oblongis, 30–45 cm. longis, 8–13 cm. latis, basi anguste rotundatis vel leviter subcordatis,



apice breviter acuminatis (acumine ad 20 mm. longo), margine anguste recurvatis et leviter undulatis, siccitate fusco-olivaceis, supra praeter costam interdum plus minusve tomentellam glabris, subtus nigropunctatis et dense (costa et nervis densissime) pilis stellatis rufo-ferrugineis tomentellis, costa supra subplana et interdum canaliculata subtus prominentissima, nervis secundariis utroque 18–25 patulis prope margines conspicue anastomosantibus supra impressis et saepe paullo prominulis subtus prominentibus; inflorescentiis e ramulis vel ramis infra folia orientibus glomerulatis, glomerulis conspicuis 1–2 cm. diametro multifloris; floribus sessilibus magnis; calycis laciniis oblongis, 5–6 mm. longis, 1.5–3 mm. latis, apice obtusis, nigro-lineolatis, extra saepe dense rufo-pubescentibus (pilis stellatis 3–5-ramosis patulis 0.4–0.7 mm. diametro), interioribus margine scariosis; petalis lineari-oblongis, 10–12 mm. longis, 1.5–2 mm. latis, nigro-punctatis, apice obtusis, intra dense et pallide villosis; staminodiis oblongis 1.5–1.7 mm. longis obtusis, apicem versus parce villosis; staminum phalangibus ligulatis, 5–6 mm. longis, circiter 0.7 mm. latis, intra parce villosis, filamentis specialibus 10–13 glabris, antheris subglobosis 0.3–0.4 mm. diametro; ovario leviter angulato glabro, stylis carnosius teretibus 7–8 mm. longis, stigmatibus subcapitatis; fructibus (ut videtur immaturis) ovoideis, 6–7 mm. longis, 4–5 mm. latis, stylis coronatis.

Type, *Krukoff* 7947, collected in August, 1936, in an old clearing along road to Aleixo, Municipality Manaus, basin of Rio Negro, Amazonas. Another collection is: Amazonas: Municipality Humayta: basin of Rio Madeira, near Livramento, on terra firma, *Krukoff* 6976. Like other species of the genus, it is known as "Lacre." Although obviously a member of the Section EUVISMIA, *V. cauliflora*, by virtue of the arrangement of its crowded sessile flowers in glomerules on the old branchlets, appears very distinct from any other described species. The extraordinarily large obovate leaves, narrowed toward the base, and the dense ferruginous tomentum of branchlets, principal leaf nerves, etc., also characterize the species.

#### MYRSINACEAE

##### ***Conomorpha madeirensis* A. C. Smith, sp. nov.**

Arbor ad 6 m. alta; ramulis teretibus fuscis juventute minute ferrugineo-tomentellis mox glabris; petiolis gracilibus rugosis 10–18 mm. longis; laminis chartaceis siccitate fuscis ellipticis, 11–15 cm. longis, 5–8.5 cm. latis, basi acutis et in petiolum decurrentibus, apice obtusis vel rotundatis, margine integris et leviter recurvatis, utrinque (supra inconspicue) punctulis minutissimis pictis, costa supra plana vel leviter elevata

subtus prominente et rugosa, nervis secundariis numerosis parallelis patulis prope margines conspicue anastomosantibus utrinque valde prominulis, venulis reticulatis leviter prominulis; inflorescentiis laxo racemosis 8–13 cm. longis multifloris solitariis, pedunculo brevi et rhachi petiolisque minutissime ferrugineo-tomentellis; pedicellis 0.5–1 mm. longis; sepalis fere ad basim liberis deltoideo-oblongis 1–1.3 mm. longis, parce glanduloso-lineolatis, apice obtusis, margine integris et minute glanduloso-fimbriatis; corolla extra glabra 3–3.5 mm. longa, lobis ad  $\frac{1}{3}$  connatis oblongis circiter 1.5 mm. latis, apice obtusis, intra minute et dense farinoso-pulverulentibus; staminibus circiter 1 mm. supra basim corollae insertis, filamentis ligulatis 0.3–0.5 mm. longis, antheris deltoideo-oblongis 0.8–1 mm. longis, basi cordatis, apice obtusis; ovario conico sub anthesi circiter 0.6 mm. longo obscure sed dense lepidoto, stylo circiter 1.3 mm. longo truncato.

Type, *Krukoff* 7240, collected Nov. 15, 1934, on margin of Rio Ipixuna between Monte Christo and Santa Victoria, Municipality Humayta, basin of Rio Madeira, Amazonas. It is a species of the alliance of *C. grandiflora* Mez and *C. magnoliifolia* Mez, both of which have coriaceous leaves strongly revolute at margins and conspicuous pedicels. In foliage, the new species more closely resembles *C. obovata* Mez, but that species has much longer pedicels and sessile anthers.

#### EBENACEAE

##### ***Diospyros tenuiflora* A. C. Smith, sp. nov.**

Frutex ad 5 m. altus; ramulis gracilibus teretibus fuscis juventute copiose puberulis mox glabris; petiolis gracilibus subteretibus 5–10 mm. longis fusco-strigosis; laminis tenuiter coriaceis siccitate olivaceo-fuscis anguste oblongis, 15–24 cm. longis, 4.5–6.5 cm. latis, basi rotundatis vel leviter obtusis, apice longe acuminatis (acumine gracili ad 15 mm. longo obtuso), supra praeter costam strigulosam glabris, subtus ad nervos pallide puberulis, costa supra profunde impressa subtus prominente, nervis secundariis utroque 9–12 prope margines conspicue anastomosantibus utrinque valde elevatis, venulis conspicue et copiose reticulatis utrinque prominulis; inflorescentiis ♂ axillaribus glomerulosis paucifloris; pedicellis ad 2 mm. longis fusco-strigosis; calyce campanulato circiter 5 mm. longo ubique dense et arcte flavido-sericeo (pilis 0.3–0.5 mm. longis), lobis 4 suberectis deltoideo-oblongis, sub anthesi circiter 3 mm. longis et 2 mm. latis, acuminatis; corolla crasse carnea urceolata 10–12 mm. longa, extra minute et parce flavido-sericea intus glabra, limbo apice constricto, apicem versus circiter 3 mm. diametro, lobis 4

in alabastro imbricatis contortis, circiter 2 mm. latis, apice obtusis; staminibus 10–12 basi corollae affixis, filamentis glabris ad 1.7 mm. longis, antheris oblongis, 1.7–2 mm. longis, dorsaliter flavido-sericeis, basi leviter cordatis, apice acuminatis, per rimas laterales dehiscentibus; ovario minuto dense setoso.

Type, *Krukoff 8431*, collected in Sept.–Oct., 1936, on varzea land near Palmares, Municipality São Paulo de Olivença, basin of Rio Solimoes, Amazonas. In vegetative characters, *D. tenuiflora* most closely resembles *D. Tessmannii* Mildbr., from which it differs by its shorter petioles, its leaf pubescence, its fewer secondary nerves and more obvious veinlets, and its slightly larger flowers, of which the corollas are only sparsely pubescent. The two species appear to form a distinct group in Hiern's Section PARALEA, differing from *D. guianensis* (Aubl.) Gürke in many details of pubescence and leaf texture.

***Diospyros bullata* A. C. Smith, sp. nov.**

Arbor parva vel frutex ad 7 m. altus (interdum scandens); ramulis crassis teretibus juventute densissime brunneo- vel ferrugineo-tomentellis demum glabris; petiolis crassis (ad 5 mm. diametro) rugosis supra complanatis 10–17 mm. longis ut ramulis tomentellis; laminis coriaceis valde bullatis ovato-ellipticis, 15–30 cm. longis, 8–15 cm. latis, basi leviter cordatis vel rotundatis, apice acuminatis (acumine 8–20 mm. longo), margine conspicue revolutis, supra praeter costam et interdum nervos secundarios tomentella glabris, subtus densissime et constanter hispidis (pilis brunneis vel ferrugineis ad 0.6 mm. longis), costa et nervis secundariis utroque 7–10 adscendentibus prope marginem conspicue anastomosantibus supra valde impressis subtus valde prominentibus, venulis reticulatis supra impressis subtus valde elevatis; inflorescentiis ♂ axillaribus cymosis ad 2 cm. longis 8–14-floris, ramulis pedicellis calycibusque densissime ferrugineo-tomentellis (pilis circiter 0.5 mm. longis); bracteis oblongis ad 5 mm. longis acutis intus glabris caducis; pedicellis 3–5 mm. longis; calyce coriaceo sub anthesi circiter 8 mm. longo, lobis ovato-deltaideis subacutis, 5–6 mm. longis, 3–4 mm. latis; corolla carnosa basi extra parce strigosa vel ubique glabra sub anthesi circiter 8 mm. longa profunde 5-lobata, lobis alabastri valde imbricatis sub anthesi rotatis ovato-oblongis obtusis, 5–6 mm. longis, circiter 3 mm. latis, basi subauriculatis; staminibus circiter 50 corollae basi affixis 2–4-seriatis, filamentis subglabris 0.4–0.8 mm. longis, antheris lineari-oblongis 2.2–3.5 mm. longis dorsaliter conspicue setosis (pilis ad 1 mm. longis) apice obtusis; ovario nullo; inflorescentiis ♀ eis supra descriptis plus minusve similibus; calyce ad 12 mm. longo, lobis elongato-



deltoideis, 8–10 mm. longis, 5–7 mm. latis; corolla sub anthesi circiter 12 mm. longa, lobis 8–10 mm. longis, 5–6 mm. latis; staminodiis circiter 18 circiter 2 mm. supra basim corollae affixis linearibus 1.7–3 mm. longis setosis (pilis circiter 2 mm. longis); ovario subgloboso densissime luteo-ferrugineo-setoso (pilis 1.3–1.8 mm. longis), loculis 6, 1-ovulatis, stylis 3 carnosus basi liberis praeter apices strigosis, apice bifidis; calyce sub fructo valde accrescente coriaceo ad 5 cm. diametro intus constanter sericeo, lobis patulis ad 2 cm. longis et 1.5 cm. latis; fructibus subglobosis ad 3 cm. diametro basim versus 5-angulatis, densissime longe setosis vel distaliter glabrescentibus, apice mucronulatis, pericarpio valde coriaceo 1.5–2 mm. crasso extra valde ruguloso.

Type, *Krukoff 8004*, collected in August, 1936, in high forest on terra firma along road to Aleixo, Municipality Manaos, basin of Rio Negro, Amazonas. Other collections from essentially the same locality are *Killip & Smith 30113*, *Ducke 360, 366*. The flowers are said to be very fragrant, the corollas white without and rosy within. Staminate flowers are described from *Ducke 366*, pistillate from *Ducke 360*, and fruits from the type, which is selected because of abundance of foliage material. On the basis of its 6-celled ovary, *D. bullata* would fall into *Maba* in Hiern's treatment, but recent students have generally preferred to merge this with *Diospyros*. In *Maba*, the new species would be sought in Hiern's Section TRICHANTHERA, in which the size, texture, and venation of the leaves immediately distinguish it. On the basis of corolla shape, stamens, etc., it is best placed in the section ROSPIDIOS, of *Diospyros*, where it has no very close allies. In flower size and texture, as well as in foliage, it bears a resemblance to *D. longistyla* A. C. Smith, but the bullate leaves and different pubescence of the new species, as well as the number of locules and styles, differentiate it.

NEW YORK BOTANICAL GARDEN.

## PAPUAN GRASSES COLLECTED BY L. J. BRASS. II.\*

AGNES CHASE

THE GRASSES HERE DESCRIBED and listed were collected in 1936 in the region of Fly River, British New Guinea. Part I of the Papuan Grasses collected by Mr. Brass, by A. S. Hitchcock, was published in *Brittonia* 2: 107-130. 1936. The types of the three species described in the present paper are deposited in the Gray Herbarium, with isotypes in the United States National Herbarium. Only species not previously collected by Mr. Brass in New Guinea are included in the present paper.

**Dendrocalamus latifolius** Lauterb. & K. Schum. in K. Schum. & Lauterb. Fl. Deutsch. Südsee 188. 1901.

*Arundinaria papuana* Lauterb. & K. Schum. in K. Schum. & Lauterb. Fl. Deutsch. Südsee 186. 1901.

*Bambusa papuana* K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Südsee 59. 1905.

*Dendrocalamus papuanus* Pilger, Bot. Jahrb. 52: 175. 1914. *Arundinaria papuana*, "being the earliest specific name," is transferred to *Dendrocalamus*, but the name has priority of place only, being published on the same date.

Middle Fly River: Lake Daviumbu, *Brass* 7908; rain forest, forming tangled thickets about 3 m. high along edges of sago swamps, on ground rooted over by wild pigs, etc. Western Division: Tarara, Wassi Kussa River, *Brass* 8518; erect clumps 3 m. high, forming thickets in disturbed rain forest; culms glaucous, leaves glaucous beneath, anthers yellow; same locality, *Brass* 8660; forming dense undergrowth 2-4 m. high, erect, in light rain forest fringing streams.

Endemic.

**Schizostachyum Brassii** A. Camus, Jour. Arnold Arb. 9: 144. 1928.

Western District: Daru Island, *Brass* 6400; gregarious in thickets, 3-3.5 m. high, along edge of creek fringing rain forest.

This collection has been compared with the type of *S. Brassii*, from Ihu, Vailala River, *Brass* 1105.

Endemic.

\*Botanical Results of the Archbold Expeditions.

**Schizostachyum** sp.

Middle Fly River: Lake Daviumbu, *Brass 7913*; abundant in thickets, 5–6 m. high, marking sites of old native camps on crests of ridges in rain forests; stems glaucous, up to 2.5 cm. in diameter, internodes more than 1 m. long, anthers green.

**Eragrostis elongata** (Willd.) Jacq. *Eclog. Gram. pl.* 3. 1813.

*Poa elongata* Willd. *Enum. Pl.* 1: 108. 1809.

Western Division: Mabaduan, *Brass 6541*; rare in savanna forests. Middle Fly River: Lake Daviumbu, *Brass 7520, 7853*; gregarious in spreading tufts on patches of hard soil in savannas. Lower Fly River: Gaima, *Brass 8349*; common in open savanna forest.

East Indies to Philippines, New Guinea, and Polynesia.

**Eragrostis subaristata** Chase, sp. nov.

Perennis; culmi caespitosi, erecti, graciles, 37–65 cm. alti; vaginae subcarinatae; ligula minutissima, ciliolata; laminae complanatae vel involutae, 6–15 cm. longae, 1.5–2.5 mm. latae; panícula purpurea, 7–15 cm. longa, ramis brevibus ascendentibus, inferioribus distantibus circa 3 cm. longis; pedicelli minuti; spiculae aliquam crebrae, 7–9 mm. longae, 2 mm. latae, 6–8-florae; glumae 1.2 et 1.7 mm. longae, acutae, 3-nerviae; lemmata 3–3.5 mm. longa, valde nervata, acuminata vel acuminatissima; palea arcuata, carinis prominentibus.

Perennial, glabrous as a whole; culms caespitose, erect, slender, 37–65 cm. tall; sheaths shorter than the internodes, slightly keeled, usually with a few delicate hairs in the throat; ligule very minute, ciliate; blades folded or involute, 6–15 cm. long, 1.5–2.5 mm. wide (opened out), often sparsely pilose at base on the upper surface; panicle purplish, 7–15 cm. long, with several rather densely flowered ascending branches, the lower distant, about 3 cm. long, the upper approximate and shorter, the axis and branches rather rigid, angled, a few delicate hairs often borne in the axils, the ultimate branchlets and pedicels scaberrulous; spikelets somewhat crowded on minute pedicels, mostly spreading, 7–9 mm. long, 2 mm. wide at maturity, 6–8-flowered, the rachilla strongly zigzag, the joints 1 mm. long or less, readily disarticulating; glumes 1.2 and 1.7 mm. long, acute, 3-nerved; lemmas 3–3.5 mm. long, with strong nerves, the summits spreading, the lower lemmas acuminate, the upper tapering into a slender awn-like tip as much as 1 mm. long; palea bowed out, the keels prominent, short-ciliate.

Type: *Brass 7879*, collected in September 1936, occasional on wet grass plains, Lake Daviumbu, Middle Fly River. A second collection is *Brass 8348*, common in open savanna forest, Gaima, Lower Fly River.



The strongly pointed lemmas and arching paleas somewhat resemble those of *Eragrostis secundiflora* Presl of North America and *E. harpachnoides* Hack. of Yunnan, China, but are much more subulate than either. In *E. harpachnoides* the spikelets fall entire, the curved pedicels disarticulating.

**Lepturus repens** (Forst.) R. Br. Prodr. Fl. Nov. Holl. 207. 1810.

*Rottboellia repens* Forst. f. Prodr. 9. 1786.

Coast between Oriomo and Fly Rivers, *Brass* 6411; sandbinding grass, not common on beach.

Islands, Ceylon to Formosa, Philippines, New Guinea, Polynesia and Hawaiian Islands.

**Aristida meraukensis** Henrard, Meded. Rijks Herb. Leiden 54<sup>e</sup> (as 55<sup>e</sup>): 725. 1933.

Western Division: Mabaduan, *Brass* 6530, 6576; common on sandy ridges in savanna forests.

Endemic.

**Eleusine indica** (L.) Gaertn. Fruct. et Sem. 1: 8. 1788.

*Cynosurus indicus* L. Sp. Pl. 72. 1753.

Western Division: Daru Island, *Brass* 6302; common weed in native gardens.

Tropics and warm temperate regions of both hemispheres.

**Dactyloctenium aegyptium** (L.) Richt. Pl. Eur. 1: 68. 1890.

*Cynosurus aegyptius* L. Sp. Pl. 72. 1753.

Western Division: Daru Island, *Brass* 6304; weed in native gardens, not common.

Tropics and warm temperate regions of both hemispheres.

**Chloris inflata** Link, Enum. Pl. 1: 105. 1821.

*Andropogon barbatum* L. Mant. 2: 302. 1771; not *A. barbatum* L. 1759.

*Chloris barbata* Swartz, Fl. Ind. Occ. 1: 200. 1797.

*Chloris paraguayensis* Steud. Syn. Pl. Glum. 1: 204. 1854.

Western Division: Daru Island, *Brass* 6403; plentiful on waste ground about the township.

Tropics of both hemispheres.

**Oryza minuta** Presl, Reliq. Haenk. 1: 208. 1830.

*Oryza manillensis* Merr. Philip. Jour. Sci. Bot. 3: 219. 1908.

Western Division: Mabaduan, *Brass* 6547; scattered in shallow

swamp shaded by swampy rain forest; plants about 1 m. tall; nodes purple, panicle erect.

Tropical Asia, East Indies, Philippines, New Guinea.

The name *Oryza latifolia* Desv. has been misapplied to this species.

**Oryza Ridleyi** Hook. f. Fl. Brit. Ind. 7: 93. 1896.

*Oryza stenothyrsus* K. Schum. in K. Schum. & Lauterb. Nachtr. Fl. Deutsch. Südsee 57. 1905.

Western Division: Tarara, Wassi Kussa River, *Brass* 8721; in small swamp.

Malay Peninsula, Sumatra, Borneo, New Guinea.

**Oryza rufipogon** Griff. Not. Pl. As. 3: 5. *pl.* 144. *f.* 2. 1851.

Middle Fly River: Lake Daviumbu, *Brass* 7564; dominant over large areas of grass-swamp, culms to 3 m. or more long, the leafy summit rising about 1 m. above the surface of the water; awns pink.

India, Ceylon, Borneo, New Guinea.

This form is commonly referred to *Oryza sativa* L. but it appears to be a perennial.

**Leersia hexandra** Swartz, Prod. Veg. Ind. Occ. 21. 1788.

*Homolocenchrus hexandrus* Kuntze, Rev. Gen. Pl. 2: 777. 1891.

Middle Fly River: Lake Daviumbu, *Brass* 7601; margins of swamps and lakes, gregarious in half submerged stands, rising about 1 m. above the surface of the water.

Tropics of both hemispheres.

**Leptaspis angustifolia** Summerh. & Hubb. Kew Bull. 1927: 40, 78. 1927.

Western Division: Tarara, Wassi Kussa River, *Brass* 8584; rain forest, in broken shade.

Fiji Islands.

**Arundinella nepalensis** Trin. Gram. Pan. 62. 1826.

Western Division: Tarara, Wassi Kussa River, *Brass* 8664; savanna forest; rare grass on swampy ground.

China, India to Indo-China; New Guinea.

A slender glabrous form with narrow blades and panicle less densely flowered than usual.

**Digitaria quinhonensis** A. Camus, Bull. Mus. Hist. Nat. Paris 27: 456. 1921.

Western Division: Tarara, Wassi Kussa River, *Brass* 8695; common weed in deserted gardens.

Indo-China and New Guinea.

**Brachiaria subquadrifida** (Trin.) Hitchc. Lingnan Sci. Jour. **7**: 214. 1931.

*Panicum subquadrifidum* Trin. Gram. Pan. 145. 1826.

Western Division: Daru Island, *Brass* 6301; common weed in native gardens.

India to Philippines, Australia and Polynesia.

**Paspalum scrobiculatum** L. Mant. Pl. **1**: 29. 1767.

*Paspalum kora* Willd. Sp. Pl. **1**: 332. 1797.

Palmer River, 1 mile above junction with Black River, *Brass* 6948; sandbinder on gravel banks.

Tropics of the eastern hemisphere.

**Panicum reptans** L. Syst. Nat. ed. 10, **2**: 870. 1759.

*Panicum prostratum* Lam. Tabl. Encycl. **1**: 171. 1791.

*Urochloa reptans* Stapf in Prain, Fl. Trop. Afr. **9**: 601. 1920.

Western Division: Daru Island, *Brass* 6303; matted on damp soil in native garden clearings.

Tropics of both hemispheres.

**Panicum macrocladum** Chase, sp. nov.

Perenne; culmi erecti vel ascendentes, 1–1.2 m. alti; vaginae papilloso-hirsutae; ligula hirsuta, 2 mm. longa; laminae planae, elongatae, 4–7 mm. latae, utrinque hirsutae; panícula breviter exserta, 40–48 cm. longa, nutans, ramis elongatis subcapillaribus scabridis; spiculæ 3.2–3.5 mm. longae, hiantes, glabrae; gluma prima 2.5–3 mm. longa, acuminata, 5–7-nervia; gluma secunda et lemma sterile subaequalia, subacuminata, 5–7-nervia; fructus 2 mm. longus, 0.9 mm. latus.

Perennial, culms erect or ascending, 1–1.2 meters tall, glabrous; nodes glabrous, often black; foliage olivaceous, the sheaths much shorter than the internodes, papillose-hirsute, the upper sometimes nearly glabrous toward the base; ligule a dense ring of hairs about 2 mm. long; blades flat, 18–30 cm. long, 4–7 mm. (mostly 5 mm.) wide, loosely hirsute on both surfaces or scabrous only toward the attenuate apex, the margins scabrous; panicle short-exserted, 40–48 cm. long, nodding, with numerous subcapillary compound branches as much as 25 cm. long, the slender angled axis and branches scabrous, the branches and branchlets finally spreading, the spikelets mostly aggregate towards the ends of the branchlets, the scabrous pedicels from about as long as the spikelets to twice as long; spikelets 3.2–3.5 mm. long, mostly gaping at the summit, glabrous; first glume from one fourth shorter to nearly as long as the



spikelet, 5-7-nerved, broad, clasping, acuminate; second glume slightly longer than the sterile lemma, both tapering to a relatively blunt but infolded and seemingly sharp tip, 5-7-nerved; fruit 2 mm. long, 0.9 mm. wide, elliptic, smooth and shining.

Type: *Brass* 6568, collected in April 1936, sporadic on damp soil in savanna forest, Mabaduan, Western Division. Other collections are: *Brass* 6350, Daru Island, swampy ground in savanna forest; *Macgregor* 18, "Kuba Kuba," New Guinea.

This species somewhat resembles *Panicum mindanaense* Merr. and *P. caudiglume* Hack., but differs from both in being perennial, taller, and with much longer narrower blades and longer panicles, the first glume not pointed beyond the spikelet as in *P. caudiglume*, and the panicle branches and spikelets much longer than in *P. mindanaense*.

*Panicum Braunii* Mez, (Bot. Jahrb. 56: Beibl. 125: 5. 1921; not *P. Braunii* Steud. 1854), described from Bismarck Archipelago, appears to be this species. The type (*Braun* 8) in the Berlin Herbarium agrees with the Brass collections but not entirely with Mez's description.

? *Panicum papuanum* Mez, Bot. Jahrb. 56: Beibl. 125: 6. 1921.

Western Division: Mabaduan, *Brass* 6485; common on old grass-grown garden lands, especially on wet soils.

Endemic.

The type of *Panicum papuanum* has not been examined but *Brass* 6485 agrees well with the inadequate description. The type cited is "Insel Waighiou (Lesson)." According to Lasègue (Mus. Bot. Delessert, p. 77. 1845) Lesson visited Waighiou, one of the Papuan islands, in September 1825. This is undoubtedly the island Waig-eoe off the northwest corner of New Guinea.

A Papuan species not represented in the Brass collection is the following:

*Panicum cruciabile* Chase, nom. nov.

*Panicum reticulatum* Thwaites in Trimen, Jour. Bot. 23: 271. 1885; not *P. reticulatum* Torr. 1852, nor Griseb. 1857.

"Hewessee, Pasdun Korle, Aug. 1865 (C.P. [Ceylon Plants] 3890 in Herb. Perad.)."

A specimen of "3890 Thwaites C P" with the name in Thwaites' script is in the U. S. National Herbarium. Hooker (Fl. Brit. Ind. 7: 48. 1896.) refers *Panicum reticulatum* Thwaites "(non Griseb.)" to *P. caesium* Nees (Hook. Kew Jour. 2: 97. 1850) and is followed by Trimen (Handb. Fl. Ceylon 5: 151. 1900), but *P. caesium* Nees in 1850 (based on *Cuming* 652 from the Philippines, but scarcely described) is invalidated by *P. caesium* Nees in Hook. & Arn. Bot. Beechey Voy. 235. 1836 (an ally of *Echinochloa crusgalli* [L.] Beauv.)

Merrill (Enum. Philippine Fl. Pl. 1: 69. 1925) refers *Panicum caesium* Nees 1850 to *Panicum tuberculatum* Presl; but examination of Presl's type, collected by Haenke and said to come from Luzon, shows it to be the same as *Panicum Mertensii* Roth (*P. megiston* Schult.) of the American tropics. Many of Haenke's localities have been found to be erroneous; this collection doubtless came from Central America or Mexico. Alston (Suppl. to Trimen, Handb. Fl. Ceylon 312. 1931) refers *Panicum caesium* Nees 1850, not 1836, to *P. luzonense* Presl. It may be that *Cuming* 652 does belong to *P. luzonense*, which has been confused in herbaria with the species described as *P. reticulatum* Thwaites. The latter is a very coarse plant, 1 m. tall or more, with strongly tuberculate-hispid sheaths and panicles 30 to 50 cm. long, the long subsimple branches commonly curving at maturity, the spikelets turgid, 2.5 mm. long, the purple glumes and sterile lemma subacute, reticulate.

The name proposed above refers to the coarse irritating hairs on the sheaths, which readily break off and irritate the skin. The grass is found in Ceylon, Burma, the Philippines, and New Guinea, whence there are two collections: Strickland River, *W. Bauerlen* 61 in 1885 (from National Herbarium of Victoria, Melbourne, Australia), and "Ambasi, Papua," *Copeland King* 1012.

Because this has been confused with other species the following specimens of *P. cruciabile* are also cited:

Ceylon: *Thwaites* C P 3890 (type collection in several herbaria). Burma: *McKerral* A18. Philippines: *Bureau of Science* 8122, 23084, 43968; *Loher* 1716; *Merrill* 123, 1469, 4229, 6707.

### ***Panicum viae* Chase, sp. nov.**

Perenne; culmi erecti vel ascendentes, 0.9–1 m. alti; vaginae tuberculato-hispidae; ligula vix 1 mm. longa; laminae planae, 9–20 cm. longae, 2–4 mm. latae, valde tuberculato-hispidae; paniculae breviter exsertae, 20–32 cm. longae, ramis patentibus usque ad 12 cm. longis, scabridis; spiculae 2 mm. longae, 0.8 mm. latae, apiculatae, glabrae; gluma prima 1 mm. longa, amplexans, abrupte apiculata, 5-nervia; gluma secunda et lemma sterile subaequalia, abrupte subacuminata, 7-nervia; fructus 1.5 mm. longus, 0.8 mm. latus.

Perennial; culms tufted, erect or ascending, 90–100 cm. tall, sparingly branching, tuberculate-hispid; nodes and sheaths tuberculate-hispid like the culms, the sheaths much shorter than the internodes; ligule a ring of stiff hairs scarcely 1 mm. long; blades flat, rather stiff, 9–20 cm. long, 2–4 mm. wide (blades of the basal shoots shorter and narrower), strongly tuberculate-hispid; panicles short-exserted, 20–32 cm. long, with numerous slender spreading compound branches, as much as 12 cm. long, the axis and branches slightly flexuous, but rather stiff, angled, scabrous, spikelet-bearing toward the ends, the pedicels about as long as the spikelets or somewhat longer; spikelets 2 mm. long, 0.8 mm. wide, plump,

abruptly short-pointed, glabrous; first glume half as long as the spikelet, clasping, abruptly pointed, 5-nerved, the nerves obscurely anastomosing; second glume and sterile lemma 7-nerved, acute, but the tips usually inrolled forming sharp points, equal, or the lemma slightly shorter; fruit 1.5 mm. long, 0.8 mm. wide, smooth and shining, at maturity olive-brown, the 5 nerves of the lemma showing as pale stripes.

Type: *Brass* 3631, collected April 11, 1933, fairly common on roadsides, Rona, Laloki River, Central Division. (Previously referred to *Panicum tuberculatum* Presl.)

This species, known only from this collection, resembles *Panicum cruciabile* Chase in its harsh tuberculate pubescence, but is a much more slender plant with much narrower blades, smaller panicles, and smaller spikelets.

***Panicum incomtum* Trin. Gram. Pan. 200. 1826; Sp. Gram. Ic. 2: pl. 232. 1829.**

*Panicum sarmentosum* of Hook. f. Fl. Brit. Ind. 7: 54. 1896; not Roxburgh, 1820.

Middle Fly River: Lake Daviumbu, *Brass* 7957; large entangling grass in old village clearing.

India, southern China, and East Indies to the Philippines and New Guinea.

*Panicum sarmentosum* Roxb., described from Sumatra, has a larger much more open panicle than has *P. incomtum*, the panicle branches not viscid. It is far less common and less widely distributed than *P. incomtum*.

***Panicum nodosum* Kunth, Rév. Gram. 1: Suppl. IX. 1830.**

*Panicum multinode* Presl, Reliq. Haenk. 1: 303. 1830; not *P. multinode* Lam. 1797.

*Panicum Arnottianum* Nees in Steud. Syn. Pl. Glum. 1: 59. 1854.

*Hemigymnia multinodis* Stapf in Prain, Fl. Trop. Afr. 9: 742. 1920.

*Hemigymnia Arnottiana* Stapf in Prain, Fl. Trop. Afr. 9: 742. 1920.

*Ottochloa Arnottiana* Dandy, Jour. Bot. 69: 55. 1931.

*Ottochloa nodosa* Dandy, Jour. Bot. 69: 55. 1931.

Western Division: Daru Island, *Brass* 6260; abundant, covering the ground under shade of rain forest margins.

India to Indo-China, Sumatra, Java, Borneo, Philippines, and New Guinea.

This specimen agrees with the original description of *P. Arnottianum* Nees, having sparsely pilose blades and simple panicle branches with pubescent spikelets on short branchlets. *Panicum nodosum*, based on



*P. multinode* Presl, has an open panicle, the glabrous spikelets less clustered. The numerous intermediate specimens and the common geographic distribution of the two forms indicate a variable species. For a further discussion of the application of the accepted binomial see Merrill, Bull. Torr. Bot. Club 60: 637. 1933.

***Panicum marginatum*** R. Br. Prodr. Fl. Nov. Holl. 190. 1810.

*Entolasia marginata* (R. Br.) Hughes, Kew Bull. 1923: 331. 1923.

Western Division: Tarara, Wassi Kussa River, *Brass* 8654; river bank, dry scrub.

Australia.

***Cleistochloa subjuncea*** C. E. Hubb. in Hook. Ic. Pl. 33: pl. 3209. 1933.

*Panicum subjunceum* Domin, Bibl. Bot. 85: 314. f. 70. 1915; not *P. subjunceum* Ekman, 1911.

*Cleistochloa Hubbardiana* Henr. Blumea 3: 161. 1938. Based on *C. subjuncea* C. E. Hubb.

Western Division: Tarara, Wassi Kussa River, *Brass* 8735; on raw clay soils.

Australia.

***Hymenachne amplexicaulis*** (Rudge) Nees, Agrost. Bras. 276. 1829.

*Panicum amplexicaule* Rudge, Pl. Guian. 1: 21. pl. 27. 1805.

Middle Fly River: Lake Daviumbu, *Brass* 7613; sporadic in stands of *Oryza* and *Leersia* in swamp margins; culms ascending, 1.5 to 2 m. long.

American tropics, India and Ceylon to Indo-China, Formosa, Java, Borneo and New Guinea.

The names *Panicum myuros* Lam. and *Hymenachne myuros* Beauv. have been commonly misapplied to this species.

***Isachne globosa*** (Thunb.) Kuntze, Rev. Gen. Pl. 2: 778. 1891.

*Milium globosum* Thunb. Fl. Japon. 49. 1784.

Middle Fly River: Lake Daviumbu, *Brass* 7602; plentiful on shores of lake; culms purple.

China to Philippines and East Indies to New Guinea and Australia.

***Echinochloa stagnina*** (Retz.) Beauv. Agrost. 53, 161, 171. 1812.

*Panicum stagninum* Retz. Obs. Bot. 5: 17. 1789.

Fly River: About 30 miles below Everill Junction, *Brass* 6585; forms pure stands along river banks in water more than 6 feet deep.

India and East Indies to Philippines and New Guinea; also tropical Africa.

**Pseudoraphis squarrosa** (L.) Chase, comb. nov.

*Andropogon squarrosus* L. f. Suppl. Pl. 433. 1781.

*Panicum asperum* Koen. Naturforscher 23: 209. 1788; not *P. asperum* Lam. 1778.

*Chamaeraphis aspera* Nees in Wall. List no. 8679. 1849. Based on *Panicum asperum* Koen.

*Pseudoraphis aspera* Pilger, Notizbl. Bot. Gart. Berlin 10: 210. 1928.

Middle Fly River: Lake Daviumbu, *Brass* 7600; slender floating aquatic, rooting in shallows of swamps, culms often 3 to 4 m. long. Western Division: Penzara, between Morehead and Wassi Kussa Rivers, *Brass* 8470; in shallows of permanent waterhole.

India to Borneo, the Philippines and New Guinea.

**Cenchrus Brownii** Roem. & Schult. Syst. Veg. 2: 258. 1817.

*Cenchrus inflexus* R. Br. Prodr. Fl. Nov. Holl. 195. 1810; not *C. inflexus* Poir. 1804.

*Cenchrus viridis* Spreng. Syst. Veg. 1: 301. 1825.

Western Division: Daru Island, *Brass* 6395; plantation weed, not plentiful.

Indo-China and the East Indies to the Philippines, New Guinea and Australia, early introduced in tropical America.

**Dimeria falcata** Hack. in DC. Monogr. Phan. 6: 85. 1889.

Middle Fly River: Lake Daviumbu, *Brass* 7806; gregarious on the wetter savannas.

South China, Indo-China and New Guinea.

**Saccharum arundinaceum** Retz. Obs. Bot. 4: 14. 1786.

Fly River: About 20 miles below Everill Junction, *Brass* 6582; in pure stands, 3 to 5 m. tall, occupying many miles of the swampy banks of the middle river. [Inflorescence affected by a smut.]

Warm temperate Asia and East Indies to the Philippines and New Guinea.

**Ischaemum arundinaceum** F. Muell. in Benth. Fl. Austral. 7: 519. 1878.

Middle Fly River: Lake Daviumbu, *Brass* 7900; dominant, often only grass over large areas of low savanna and wet plain, coarse matted growth 1 to 1.5 m. high. Lower Fly River (east bank): Gaima, *Brass* 8259; common in savanna forests. Western Division: Tarara, Wassi Kussa River, *Brass* 8751; savanna forest, not common.

Australia.

**Ischaemum aristatum** L. subsp. **barbatum** Hack. in DC. Monogr. Phan. 6: 204. 1889.

*Ischaemum barbatum* Retz. Obs. Bot. 6: 35 [error for 25]. 1791.

Western Division: Daru Island, *Brass* 6253; frequent in tall grass cover of savanna forests.

India, Indo-China, Java and New Guinea.

In this specimen the nodules on the first glume of the perfect spikelets are obsolete or nearly so.

**Ischaemum pubescens** Merr. Philip. Jour. Sci. Bot. 9: 264. 1914.

Lower Fly River (east bank): Gaima, *Brass* 8260; occasional in savanna forest grass cover; culms often reclining, to 1.5 m. long.

Philippines.

**Sclerandrium truncatiglume** (F. Muell.) Stapf & Hubb. in Hook. Ic. Pl. 33: pl. 3262. 1935.

*Ischaemum truncatiglumis* F. Muell. in Benth. Fl. Austral. 7: 518. 1878.

Western Division: Tarara, Wassi Kussa River, *Brass* 8537, 8665; savanna forest, occasional on stream banks.

Australia.

**Eremochloa bimaculata** Hack. in DC. Monogr. Phan. 6: 265. 1889.

Western Division: Wuroi, Oriomo River, *Brass* 5743 (previously referred to *Eremochloa ciliaris* [L.] Merr.); rare on gray-soil savanna ridges, alt. 10–30 m. Tarara, Wassi Kussa River, *Brass* 8408; savanna forests, common.

India.

**Rottboellia exaltata** L.f. Suppl. 114. 1781.

*Manisuris exaltata* Kuntze, Rev. Gen. Pl. 2: 779. 1891.

*Stegosauria exaltata* Nash, N. Amer. Fl. 17: 84. 1909.

Western Division: Daru Island, *Brass* 6296; plentiful, forming dense brakes on wet garden land behind mangroves; culms erect, to 2 m. tall; hairs on foliage irritating to the skin.

Tropics of both hemispheres.

**Thaumastochloa rariflora** (F. M. Bailey) C. E. Hubb. in Hook. Ic. Pl. 34: pl. 3313. 1936.

*Rottboellia rariflora* F. M. Bailey, Dept. Agric. Brisbane Bot. Bull. 8: 86. 1893.

Western Division: Mabaduan, *Brass* 6554; occasional under the dominant *Themeda triandra* Forsk., in savanna forests. Wuroi, Oriomo River,



alt. 30 m., *Brass* 6014; uncommon, on gray-soil savanna ridge. (Previously referred to *Ophiurus pubescens* [Benth.] Domin.)

Australia.

*Thaumastochloa* C. E. Hubb., with *Ophiurus pubescens* as type, was published (Hook. Ic. Pl. 34: pl. 3313-3314. 1936) after Part I of The Papuan Grasses appeared. A specimen of *Thaumastochloa pubescens* (Benth.) C. E. Hubb. was later received by the U. S. National Herbarium. The raceme in that is longer, with 4-9 spikelets, the first glumes strongly rugose. This species has not been found in New Guinea. In *T. rariflora* the raceme is reduced to 1 or 2 spikelets, the glumes smooth.

***Andropogon sanguineus* (Retz.) Merr.** Philip. Jour. Sci. Bot. 12: 101. 1917.

*Rottboellia sanguinea* Retz. Obs. Bot. 3: 25 [13]. 1783.

Middle Fly River: Lake Daviumbu, *Brass* 7933; occasional on sour savanna slopes.

Southern China and India and Indian Archipelago to Indo-China, Philippines and New Guinea.

***Andropogon annulatus* Forsk. var. *monostachys* F. Muell.;** Benth. Fl. Austral. 7: 531. 1878.

Western Division: Daru Island, *Brass* 6404; growing about the wharf, apparently of recent introduction. Central Division: Port Moresby, 200 m. alt., *Brass* 8787; common on roadsides.

Australia.

***Vetiveria filipes* (Benth.) C. E. Hubb.** Kew Bull. 1934: 444. 1934.

*Chrysopogon elongatus* (R. Br.) Benth. var. *filipes* Benth. Fl. Austral. 7: 539. 1878.

Western Division: Penzara, between Morehead and Wassi Kussa River, *Brass* 8460; savanna-forests, on alluvial flats of creek. Tarara, Wassi Kussa River, *Brass* 8579; covering small tidal flats behind mangrove fringe.

Australia.

***Rhaphis aciculata* (Retz.) Desv.** Opusc. 69. 1831.

*Andropogon aciculatus* Retz. Obs. Bot. 5: 22. 1789.

*Rhaphis trivialis* Lour. Fl. Cochinch. 553. 1790.

*Chrysopogon aciculatus* Trin. Fund. Agrost. 188. 1820.

Western Division: Daru Island, *Brass* 6426; troublesome weed on roadsides and town allotments.

India and southern China to the Philippines, New Guinea, Australia and Polynesia.

**Heteropogon triticeus** (R. Br.) Stapf, Kew Bull. 1912: 432. 1912.

*Andropogon triticeus* R. Br. Prodr. Fl. Nov. Holl. 201. 1810.

Western Division: Mabaduan, *Brass* 6538; locally dominant on drier soils of savanna forest, a few culms in the clumps to 2.5 m. tall.

Ceylon, Java, the Philippines, New Guinea and Australia.

**Themeda australis** (R. Br.) Stapf in Prain, Fl. Trop. Afr. 9: 420. 1919.

*Anthisteria australis* R. Br. Prodr. Fl. Nov. Holl. 200. 1810.

Central Division: Port Moresby, 200 m. alt., *Brass* 8782; open savanna forest; dominant grass on stony hillsides; clumps 1.5–2 m. tall.

Australia.

**Themeda frondosa** (R. Br.) Merr. Dept. Agr. Nat. Res. Bur. Sci.

Manila Publ. No. 9: 89. 1917.

*Anthisteria frondosa* R. Br. Prodr. Fl. Nov. Holl. 200. 1810.

Western Division: Mabaduan, *Brass* 6474; locally abundant on sandy soil in savanna forests.

Indian Archipelago to New Guinea and New Caledonia.

UNITED STATES NATIONAL HERBARIUM,

WASHINGTON, D. C.

## COMBRETACEAE OF THE 1936 ARCHBOLD EXPEDITION (FLY RIVER, BRITISH NEW GUINEA)

A. W. EXELL

**Combretum trifoliatum** Vent., Choix de Pl. t. 58 (1808).

WESTERN DIVISION: Middle Fly River, Lake Daviumbu, fl. Sept. 1936, *L. J. Brass* 7709, rain-forest; large scrambling shrub, plentiful on shores of lake.

This species is widespread in the Indo-Malayan region from Assam and Indo-China to New Guinea, but it is apparently absent from the Philippines. The specimen collected extends the known range of the species southwards, as the only other New Guinea records are from the Sepik region in the north-east, in the former German colony.

**Quisqualis indica** L., Sp. Pl. ed. 2, 1: 556 (1762).

WESTERN DIVISION: Lower Fly River, east bank opposite Sturt Island, fl. Oct. 1936, *L. J. Brass* 8198, scrambling on river-banks and commonly climbing to the tops of tallest forest-trees; flowers white, later red.

This species, often cultivated in the tropics, is indigenous in the Indo-Malayan region and undoubtedly wild in New Guinea.

**Terminalia Catappa** L., Mant. 1: 128 (1767).

WESTERN DIVISION: coast between Oriomo and Fly Rivers, fl. March 31, 1936, *L. J. Brass* 6416, one of the chief components of beach-forests; large spreading tree with thick tessellate bark; flowers white.

Widespread coastal species in the Indo-Malayan and Polynesian regions; often planted in other parts of the Tropics.

**Terminalia Copelandii** Elm., Leaflets Philipp. Bot. 5: 1759 (1913).

WESTERN DIVISION: Lower Fly River, east bank opposite Sturt Island, fl. Oct. 1936, *L. J. Brass* 8027, very conspicuous flat-topped tree towering above general level of the flood-plain forests; trunk heavily buttressed; bark thick, brown, long-fissured, peeling in small suberose scales; wood brown, tough; flowers white; tree bare of leaves in Sept.-Oct.

If this is correctly identified it is an interesting discovery of a species hitherto known, as far as I am aware, only from Palawan, Philippine

Islands, where it grows in the coastal forests, presumably in very similar conditions to those in which it was found growing by Brass in Papua. The leaves, inflorescences and twigs agree very well with the Palawan species but in the absence of fruit, often of great taxonomic value in this genus, the identification must remain doubtful.

***Terminalia* cf. *Kaernbachii*** Warb. in Bot. Jahrb. 18: 201 (1893),  
ex descr.

WESTERN DIVISION: Palmer River, two miles below the junction of Black River, fr. June, 1936, *L. J. Brass* 6973, common, very conspicuous tree in riverine forests, 35 m. tall, straight bole, flange-buttressed base; bark grey flaky, inner purplish; leaves at ends of branchlets; fruits red, fleshy, sessile, solitary on peduncle.

I have seen no specimen of *T. Kaernbachii* but *Brass* 6973 agrees well with the description except that the fruit is a little smaller than in *T. Kaernbachii* (6.5 cm. long instead of 8 cm. long) and more flattened. *Terminalia Kaernbachii* is endemic to New Guinea.

***Terminalia* aff. *edulis*** Blanco, Fl. Filip. ed. 2, 265 (1845).

WESTERN DIVISION: two miles below junction of Black River, fr. June, 1936, *L. J. Brass* 6970, tree 20 m., leaves thin, red when old, fruit green, compressed, about 2 cm. long, 1 cm. in diam.; same locality, fr. July, 1936, *L. J. Brass* 7288, principal primary forest tree on sandy silt-loams of river flood-plains, up to 30 m. tall with well-developed flank-buttresses; bark thin, fibrous, suberose, with vertical furrows; same locality, fl. July, 1936, *L. J. Brass* 7350, abundant in forests of lower ridges; large semi-deciduous canopy-tree; trunk spur-buttressed; bark brown, thin, flaky, wood pale, of cedar-like appearance, leaves, (still young) concave; flowers white; Fly River, between junctions of Alice and Elevata Rivers, fr. Aug., 1936, *L. J. Brass* 7388, semi-deciduous tree attaining to 20 m., on river-banks.

These specimens show a close general resemblance to *T. edulis* Blanco, a common species in the Philippine Islands. The Papuan specimens, however, have a sparser indumentum at all stages, the leaves, petioles and twigs becoming practically glabrous. Collections from intermediate regions are required to show whether the range and variation are discontinuous or not.

***Terminalia hypargyrea*** Laut. & K. Schum., Fl. Deutsch. Schutzgeb. Südsee, 467 (1901).

*Terminalia sogerensis* Bak. f. in Jour. Bot. 61, Suppl.: 14 (1923).

WESTERN DIVISION: Middle Fly River, Lake Daviumbu, fl. Sept.,



1936, *L. J. Brass* 7782, rain-forest, occasional near shores of lake; tree with spur-buttressed stem; bark thin, brown, exfoliating in thin suberose flakes; Lower Fly River, Gaima, fr. Nov., 1936, *L. J. Brass* 8315, substage tree 12 m. high, in light rain-forest; bark thin, suberose, slightly fissured; fruit red, compressed; Wassi Kussa River, Tarara, fr. Dec., 1936, *L. J. Brass* 8551, gallery extensions of rain-forest; tree 10–12 m.; branches horizontal; bark hard, fissured; wood yellow; fruit red, fleshy, covered with purplish bloom.

Endemic to New Guinea.

**Terminalia** cf. **complanata** K. Schum. & Hollr., Fl. Kais. Wilh. Land, 83 (1889).

WESTERN DIVISION: Daru Island, fr. April, 1936, *L. J. Brass* 6433, uncommon in rain-forest canopy-layer; large spur-buttressed tree, 20 m. high, spreading crown; bark yellow-brown, laminated, fibrous within, very thin pale brown outer corky later, wood tough, fibrous, stains paper yellow.

This differs from typical *T. complanata* in having a persistent ferruginous-sericeous indumentum on the branchlets and lower surfaces of the leaves. *Terminalia complanata* shows traces of a similar indumentum on the young parts but is rapidly glabrescent.

*Terminalia complanata* has been recorded from New Guinea and the Solomon Islands.

**Terminalia crassifolia** Exell, sp. nov.

*Arbor* ad 8 m. alta, ramulis 4–6 mm. in diam. crassis primo pubescentibus demum glabrescentibus. *Folia* ad apicem ramulorum conferta, petiolata, petiolo  $\pm$  applanato, 7–13 mm. longo, primo sericeo demum appresse puberulo, lamina subcoriacea obovata apice rotundata nonnunquam breviter apiculata basi plerumque cuneata paullo inaequilaterali, 6–11  $\times$  3.5–7.5 cm., supra minute inconspicue pustulata ceteroque glabra subtus ad nervos sparse appresse puberula ceteroque fere glabra, costa media subtus prominente, nervis lateralibus utrinque 9–11. *Flores* sessiles in spicas axillares ad 11 cm. longas dispositi, rachi pubescente. *Receptaculum* superius campanulatum (lobis inclusis) 3.5  $\times$  2.5 mm., glabrescens, lobis (sepalis) deltoideis, 1.3  $\times$  1.3 mm., glabris, inferius 2 mm. longum dense sericeum. *Discus* 4.5 mm. in diam. dense pilosotomentosus. *Stamina* 10, antheris subglobosis, 0.8 mm. in diam., filamentis 3 mm. longis. *Stylus* 4 mm. longus. *Fructus* ellipsoideus leviter compressus, in sicco 1.2–1.3  $\times$  7–8 mm., primo dense demum sparse appresse puberulus.

WESTERN DIVISION: Mabaduan, fl. & fr. April, 1936, *L. J. Brass* 6478 (Typus in Herb. Mus. Brit.), common in light rain-forests on granite slope, densely foliated, horizontally branched tree, 6–8 m. tall, ripe fruit dark purple, somewhat compressed  $\pm$  1.5 cm. long, 1 cm. in diam.; Mabaduan, young fr., April, 1936, *L. J. Brass* 6527, common in savannah-forest substage; small tree, 7–8 m. high; unripe fruit compressed, minutely puberulent.

This species is very near to *T. Muelleri* Benth. from Queensland and the islands in the Gulf of Carpentaria. It differs in having a sericeous lower receptacle (glabrous in the Australian species) and slightly smaller fruits.

### **Terminalia** sp.

WESTERN DIVISION: Lower Fly River, east bank, opposite Sturt Island, fl. Oct., 1936, *L. J. Brass* 8048, rain-forest; large spur-buttressed tree, common on lower ridges; bark brown, flaky-scaly, yellow when cut; wood yellow; flowers green; branchlets and petioles glaucous.

This is apparently a new species but I do not care to describe it without fruits. The leaves are similar to those of *T. papuana* Exell (but with longer petioles) and of *T. solomonensis* Exell.

**Lumnitzera littorea** (Jack) Voigt, Hort. Suburb. Calc. 39 (1845).

*Pyrrhanthus littoreus* Jack, Malay. Misc. II, 7: 57 (1822).

WESTERN DIVISION: Daru Island, fl. 29 Feb., 1936, *L. J. Brass* 6228, open places in better-drained parts of mangroves; shrub or small tree to 5 m.; bark rough, reddish brown; flowers white; Wassi Kussa River, Tarara, fl. & fr., Jan., 1937, *L. J. Brass* 8691, common small tree in mangroves; bark rough, fissured; flowers red.

This species occurs in mangrove-formations in tropical Asia, tropical Australia and Polynesia.

BRITISH MUSEUM, NATURAL HISTORY,  
LONDON.

# ENUMERATION OF THE ARALIACEAE COLLECTED BY L. J. BRASS IN NEW GUINEA<sup>1</sup>

H. HARMS

**Boerlagiodendron** forsan aff. **B. Ledermannii** Harms in Bot. Jahrb.  
56: 383 (1921).

Fly River, 528 mile Camp, 80 m. alt. Common along edge of forest on muddy banks of river. Sparsely branched tree 2-4 m.; inflorescence purple. May, 1936; *L. J. Brass* 6794.

**Boerlagiodendron** aff. **B. stenolobum** Harms, l. c. 382.

Palmer River, 2 miles below junction Black River, muddy banks of sluggish backwater creeks. Sparsely branched shrub 2-3 m.; inflorescence purple. June, 1936; *L. J. Brass* 7056.

Specimen lobis folii latioribus differt.

**Boerlagiodendron** (folium).

Fly River, 528 mile Camp, 80 m. alt. Common along edge of forest on muddy banks of river. Sparsely branched tree 2-4 m.; inflorescence purple. May, 1936; *L. J. Brass* 6794.

**Schefflera macrostachya** (Benth.) Harms; cf. Harms in Bot. Jahrb.  
56: 389 (1921).

Rona, Central Division, 450 m. alt. Common on or about rocks outside rain forest in Laloki River gorge. Tree to 12 m. tall, few thick branches, erect or nearly erect, at apex large leaves; petiole near 1 m. long; persistent stipule; flowers red, in stout terminal panicle 20-30 cm., erect above leaves. Feb., 1936; *L. J. Brass* 6209.—Upper Wassi Kussa River (left branch), Western Division; rain forest, epiphyte on river-bank trees. Tree 6-8 m., branches of inflorescence spreading when in fruit; flowers red; fruits black, fleshy. January, 1937; *L. J. Brass* 8618.

Species in Papuasias late distributa.

**Schefflera Rudolfi** Harms, l. c. 394.

Palmer River, 2 miles below Black River Junction, 100 m. alt. Sparsely branched shrub (epiphytic), found near ground in all types of rain forest. April, 1936; *L. J. Brass* 6891.—Same locality. Unbranched

<sup>1</sup>Botanical Results of the Archbold Expeditions.

shrub, 1.5 m. h.; terrestrial in forest undergrowth; fruit red. June, 1936; *L. J. Brass* 7055.

Specimina pedunculis longioribus a typo diversa.

***Schefflera venulosa*** (W. & A.) Harms; cf. Harms, l. c. 406.

Lower Fly River, east bank opposite Sturt Island; rain forest. High climbing liane, common on ridges; panicle yellow; ripe fruit red. October, 1936; *L. J. Brass* 8040.

***Schefflera Versteegii*** Harms, l. c. 403.

Palmer River, 2 miles below Black River Junction, 100 m. alt. Arborescent epiphyte in ridge forest; stem unbranched; panicle terminal, 40 cm. long., with many radial branches; flowers green. July, 1936; *L. J. Brass* 7296.

***Schefflera Brassii*** Harms, sp. nov.

Frutex epiphyticus magnus; folia magna digitata, vagina lata crassa setis laciniiformibus obsita, petiolo in folio unico suppetante glabro 55 cm. longo, apice nodoso-incrassato; foliola 5 (probaliter plura, forsitan 7-9), oblongo-oblancheolata vel anguste oblonga, basi angustata rotundata vel obtusa, apice acuminata, chartacea, glabra, nervis lateralibus utrinque circ. 7-11 cum costa subtus prominulis inter se spatio lato distantibus; panicula terminalis, ampla, pedunculo puberulo, bracteis lanceolatis setulis vel setis laciniiformibus obsitis, rhachi puberula 20 cm. longa, paniculas secundarias complures (8-10) racemiformes umbelluligeras 12-25 cm. longas gerente, rhachibus tenuibus puberulis; umbellulae racemose dispositae numerosae, parvae, pedunculis puberulis 6-7 mm. longis, ad basim florum parce pilosis, 7-10-florae, pedicellis 3-4 mm. longis, cum ovario fere 1.5 mm. longo glabris; corolla in specimine delapsa; stamina 5; discus leviter elevatus, stylis obsoletis.

PAPUA: Middle Fly River, Lake Daviumbu, September, 1936; *L. J. Brass* 7746; large epiphytic shrub, common in rain forests, flowers white.

Species floribus minimis in umbellulas parvas vel rhachin elongatam dispositis distincta.

***Schefflera fimbriata*** (F. Muell.) Harms; cf. Harms in Bot. Jahrb. 56: 402 (1921). — *Heptapleurum fimbriatum* F. Muell. (1877).

Fly River, 528 mile Camp, 80 m. alt. Common epiphytic shrub in river flood-bank forest. May, 1936; *L. J. Brass* 6786.— Palmer River, 2 miles below Black River Junction. Unbranched shrub 1 m. June, 1936; *L. J. Brass* 6912.— Same locality, 100 m. alt. Common low shrub on river-banks; fruit purple-red. July, 1936; *L. J. Brass* 7239.—



Same locality. Epiphytic, 2–3 m. above ground level on river-bank trees; unbranched shrub, 1.5 m.; flowers white. July, 1936; *L. J. Brass* 7261.

Flores haud in spicas dispositi (ut prius putavi), sed in umbellulas capituliformes ad rhachin elongatam subsessiles.

**Polyscias Caroli** Harms in Bot. Jahrb. 56: 411 (1921).

Lake Daviumbu, Middle Fly River; edge of light rain forest. Sparsely branched shrub, 1–2 m. h.; flowers white. September, 1936; *L. J. Brass* 7922.—Gaima, Lower Fly River (east bank). Common in outskirts of rain forest. Shrub, 1–2 m.; branched or not branched. September, 1936; *L. J. Brass* 8372.—Tarara, Wassi Kussa River, Western Division. Common in inferior rain forest. Shrub 1–1.5 m.; ripe fruit, soft, black. January, 1937; *L. J. Brass* 8740.

**Polyscias elegans** (C. Moore & F. Muell.) Harms.

Tarara, Wassi Kussa River, Western Division. Tree 7–9 m. common in rain forest substage; inflorescence purple, anthers yellow. Terminal panicle about 40 cm. long. January, 1937; *L. J. Brass* 8656, 8748.

**Polyscias Branderhorstii** Harms in Bot. Jahrb. 56: 412 (1921) forsan serius cum *P. elegans* conjugenda.

**Anomopanax cf. A. Schlechteri** Harms.

Palmer River, 2 miles below Black River Junction, 100 m. alt. Rare in forest undergrowth; plant unbranched, 60 m. high; flowers white. July, 1936; *L. J. Brass* 7322.

**Anomopanax variaefolius** C. T. White in Jour. Arnold Arb. 10: 256 (1929).

Fly River, Oroville Camp. Epiphyte in forest; large fleshy sparsely branched shrub; leaves 80–90 cm. long; flowers cream-colored. August, 1936; *L. J. Brass* 7409.

## PLANTAE PAPUANAE ARCHBOLDIANAE. I\*

E. D. MERRILL AND L. M. PERRY

THIS PAPER is the first one of a series planned to include data on the assembled Papuanian material available at the Arnold Arboretum. The intention is to include, under various natural groups, descriptions of apparently hitherto undescribed species, records of those previously described from other regions but, so far as our records show, not before reported from the particular geographical area herein noted, and nomenclatural notes. Most of the data appertain to material assembled by the Richard Archbold Expeditions, through the activities of Mr. L. J. Brass who has served as botanist for the first three New Guinea expeditions. The very extensive collections assembled during the third expedition, which operated in the Netherlands New Guinea in 1938, have not yet been arranged for study. We have included data on other collections available to us, not only from New Guinea but also from the earlier L. J. Brass and S. F. Kajewski collections from the Solomon Islands. Our work has been greatly facilitated through the courteous loan of the extensive card index to New Guinea species prepared during the past six years at the New York Botanical Garden, covering the known literature appertaining to that large island. The types of the new species herein described, unless otherwise stated, are deposited in the herbarium of the Arnold Arboretum.

## ULMACEAE

***Parasponia paucinervia* sp. nov.**

Arbor parva, usque ad 7–8 m. alta; ramulis novellis subsericeis vel breviter villosis, demum glabris; foliis lanceolatis, 6–8.5 cm. longis, 2–3 cm. latis, sensim acuminatis, basi obtusis vel subrotundatis et interdum leviter inaequalibus, margine basi excepta dense crenatoserratis, supra asperulis, costa media nervisque primariis impressis,  $\pm$  strigillosis, subtus costa, nervis venulisque strigosis ad strigillosis, nervis basalibus 3, lateralibus supra basin utrinque 1–2 valde ascendentibus; petiolo 7–11 mm. longo, dense subadpresse pubescente; stipulis in unam intrapetiolaem bicuspidatam extus praesertim in costis adpresse pubescentiam  $\pm$  4 mm. longam connatis; cymis axillaribus; floribus ♀

\*Botanical Results of the Richard Archbold Expeditions.

tantum visis; perianthii laciniis 1 mm. longis, oblongis, obtusis, ciliolatis, puberulis; ovario obovoideo, apice lato, basi attenuato; stigmatibus 2, incurvis, intus pubescentibus; toro piloso; drupis parvis (2 mm. longis), ovoideis, stigmatibus marcescentibus coronatis, basi perianthio suffultis.

SOLOMON ISLANDS: Guadalcanal Island, *Kajewski 2590* (type), April 26, 1931, rain-forest (rough barren country), at 200 m. alt., common (small tree up to 7 or 8 m. high; fruit about  $\frac{3}{4}$  grown on the specimens).

This species is very much like *Parasponia parviflora* Miq. but differs in the fewer lateral nerves; the first lateral nerve above the base arises from the midrib about half way to the apex of the leaf. In *P. parviflora* Miq. the lateral nerves are twice as many and are rather evenly distributed along the midrib of the leaf. The specimen here described has only ♀ inflorescence.

***Gironniera grandifolia* sp. nov.**

Arbor gracilis, 12–15 m. alta; ramulis glabratiss; foliis ellipticis, 30–38 cm. longis, 13–16 cm. latis, apice obtusis? (apicibus foliorum deficientibus in specimine viso), basi rotundatis, inaequalibus, margine integris vel subdenticulatis, penninerviis, supra glabris, subtus nervis exceptis glabris; nervis  $\pm$  adpresso-hirsutis, lateralibus 16–18, supra vix impressis, subtus prominentibus, reticulato-venosis; petiolo  $\pm$  8 mm. longo; stipulis 2, lineari-lanceolatis, adpresso-pilosis; inflorescentiis compactis (♀ 3 cm. longis, 4 cm. latis; ♂ immaturis, vix 1 cm. diametro), axillaribus vel lateralibus; floribus ♂ (alabastris immaturis tantum) sessilibus; staminibus 5, pistilli rudimento lineari-oblongo; floribus ♀ sessilibus; perianthio persistente, laciniis inaequalibus, acutis, vix 1 mm. longis; stylo  $\pm$  2 mm. longo; stigmatibus filiformibus, intus breviter velutinis, usque ad 17 mm. longis; drupis rotundato-ovatis, lenticularibus, minute strigillosis, (immaturis) 5 mm. longis, stylo stigmatum basique coronatis; putamine subrotundo (4 mm. longo, 5 mm. lato), leviter obliquo.

SOLOMON ISLANDS: San Cristoval Island, Magoha River, *Brass 2731* (type), 2728, August 25, 1932, rain-forests at 150 m. alt., common (slender loosely branched tree 15 m. tall; bark brittle, pale brown; leaves spreading horizontally, glossy above; flower brown).

This species is most like *Gironniera celtidifolia* Gaudich. but the leaves are larger and scarcely at all dentate near the apex, the inflorescence is somewhat less compact, the floral bracts are shorter and broader and only short-pilose as compared to the hirsute ones of the latter species; further the style and the stigmas in *G. grandifolia* are relatively longer

than those of *G. celtidifolia* Gaudich. (Gaudichaud's plate of *G. celtidifolia* shows stipules at more than one node as if persistent; the only collection of this species [?] which has definitely persistent stipules is from Ponape Island [*Kanehira* 797]; in this specimen also the leaf-bases are oblique and  $\pm$  auriculate).

***Gironniera subaequalis*** Planch. Ann. Sci. Nat. III Bot. 10: 339. 1848, ? var. ***papuana*** J. J. Smith, Nova Guinea 8: 892. 1912.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass* 8174, October, 1936, rain-forest of dry inland ridges (sub-stage tree 16–20 m. tall); Oroville Camp, Fly River, *Brass* 7433, August, 1936, common in rain-forest undergrowth (tree 6–7 m. high).

Both collections are in practically the same stage of development, yet the branchlets of *Brass* 7433 are spreading-hirsute while those of *Brass* 8174 are appressed-hirsute. In both, the leaves are predominantly ovate with a rounded and slightly oblique base; the apex of the older leaves is almost obtuse then abruptly produced into a slender acumen 4(–5) mm. broad at the base and 1.5 cm. long.

The species ranges from Ceylon to southern China, Malaysia, the Philippine Islands to Fiji. There is so much variation in the material that we have very hesitantly assigned our collections to the variety reported from New Guinea; however, a record of these two collections may be helpful to someone making a special study of the group. Without adequate material for comparison we have been unable to distinguish clearly the differences between *Gironniera subaequalis* Planch. and *G. amboinensis* Lauterb.; hence, we are somewhat hesitant in making this determination.

***Gironniera celtidifolia*** Gaudich. var. ***Hombroniana*** Planch. in DC. Prodr. 17: 207. 1873.

SOLOMON ISLANDS: Ysabel Island, Maringe, *Brass* 3191, November 23, 1932, limestone hills (much branched tree 6–8 m. tall; leaves stiff and slightly scabrous); Malaita Island, Asubiah, *Kajewski* 2343, December 11, 1930, rain-forest (fruit black when ripe).

These collections seem to be sufficiently different from the typical form of the species to warrant giving them some particular designation. We have placed them under the above variety which was described from the Solomon Islands.

***Gironniera retinervia*** sp. nov.

Arbor 10–15 m. alta; ramulis sparse strigosis; foliis ellipticis, acumina-  
tis, basi inaequalibus obtusisque, 7–13 cm. longis, 3–5 cm. latis,



marginē denticulatis vel subintegris, supra glabris, sub lente reticulatis, subtus praecipue costa media nervisque primariis sparse strigillosis, valde reticulatis; petiolo  $\pm$  7 mm. longo, strigilloso; stipulis linearibus, 1.5 cm. longis; inflorescentiis ♂ axillaribus, (immaturis) compactis; staminibus 5; inflorescentiis ♀ axillaribus, plerumque geminatis, simpliciter racemosis, (in specimine) usque ad 3.5 cm. longis; floribus sessilibus vel breviter pedicellatis; perianthio persistente, laciniis 4(?), late ovatis, vix 1 mm. longis; drupis (immaturis) scabridis, rotundato-ovatis (4 mm. longis, 5 mm. latis), lenticularibus, stylo stigmatum basique coronatis; stylo 1.5 mm. longo; stigmatibus 2, filiformibus, circiter 8 (?) mm. longis.

SOLOMON ISLANDS: Bougainville Island, Kupei Gold Field, *Kajewski* 1646 ♀ (type), April 8, 1930, rain-forest, at 950 m. alt., common; San Cristoval Island, Hinuahaoro, *Brass* 2873 ♂, September 16, 1932, mountain-forests, at 900 m. alt., common (large shrub; the lower surface of the leaves scabrous, the upper shining).

The general habit of this species is somewhat similar to that of *Gironniera subaequalis* Planch., but the leaves are smaller, very oblique at the base and strongly reticulate on both surfaces, and the style and stigmas are shorter than in the latter species.

#### NYCTAGINACEAE

**Ceodes umbellifera** J. R. & G. Forster, Gen. Plant. 142, t. 71. 1776; Skottsberg, Svensk Bot. Tidskr. 30: 723. 1936.

SOLOMON ISLANDS: Bougainville Island, Kugumaru, Buin, *Kajewski* 1990, common in rain-forest at 150 m. alt. Malay Archipelago to Polynesia including Hawaii, but not specifically reported previously from the Solomon Islands.

**Ceodes corniculata** (Bargagli-Petrucci) comb. nov.

*Pisonia corniculata* Bargagli-Petrucci, Nuov. Giorn. Bot. Ital. II. 8: App. 615. 1901.

*Calpidia corniculata* Heimerl, Oesterr. Bot. Zeitschr. 63: 283. 1913.

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, *Brass* 6789, May, 1936, at 80 m. alt., characteristic forest undergrowth on muddy banks of backwater creeks cutting the river flood-banks (tree of open, rather weak, branching habit, attaining 5–7 m.; leaves glabrous, of soft texture). Described from New Guinea, and reported by Heimerl from Batjan in the Moluccas.

With only the original description of this species for comparison, we

hesitate to assign this collection (with ♂ flowers and immature fruit) elsewhere, although some leaves are much larger (up to 33 cm. long, 11 cm. broad) than in the original, and the lateral nerves are only 7–8.

***Ceodes longirostris* (Teysm. & Binn.) comb. nov.**

*Pisonia longirostris* Teyssm. & Binn. Nat. Tijdschr. Nederl. Ind. 25: 401. 1863; Valeton, Ic. Bogor. 1: 69, t. 21 (fig.), 22 (descr.). 1897.

*Calpidia longirostris* Heimerl, Oesterr. Bot. Zeitschr. 63: 287. 1913.

*Pisonia triandra* Bargagli-Petrucci, Nuov. Giorn. Bot. Ital. n. ser. 8: App. 610. 1901.

*Pisonia Beccariana* Bargagli-Petrucci, op. cit. 612.

*Calpidia triandra* Heimerl, op. cit. 289.

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, *Brass* 6639, May, 1936, occasional in moist deeply shaded forest (sparsely branched spreading shrub  $\pm$  2 m. high; leaves clustered at intervals along the branches; masses of slender rootlets produced in leaf-axils which collect humus from falling leaves of forest trees; flowers small, brown; fruit [young]  $\pm$  40 cm. long, viscid); Palmer River, 2 miles below Black River Junction, *Brass* 7196, July, 1936, at 100 m. alt., gregarious in practically pure stands on points of low ridges abutting on river-flat (erect shrub, branched or unbranched,  $\pm$  1 m. high; flowers brown; fruit viscid); Lower Fly River, east bank opposite Sturt Island, *Brass* 8036, October, 1936, occasional in flood plain river-forest; Central Division, Dieni, Ononge Road, *Brass* 3912, April 29, 1933, at 500 m. alt., in rain-forest (slender tree 20 m. tall; leaves dull, thick, margin narrowly recurved; flowers brown). Described from Boeroe in the Moluccas, apparently common in New Guinea.

In the collection *Brass* 8036 some leaves are 80 cm. long and 19 cm. broad, the apex in the leaves of all the collections is variable, some leaves being rounded whereas others are obtuse to bluntly acuminate.

From the Solomon Islands we have two very similar collections with somewhat smaller leaves and young flowers only: Bougainville Island, Kieta, *Kajewski* 1612, March 29, 1930, rain-forest, at 100 m. alt., common (shrub up to 3 m. high); Ulawa Island, *Brass* 2966, October 5, 1932, rain-forest on slopes of central mountain, at 200–300 m. alt., common (small, crooked, branched tree; leaves fleshy; flowers brown).

On account of the similarity in flowering specimens (indicated by Valeton, Bot. Jahrb. 52: 103. 1914) of *Ceodes longirostris* (Teyssm. & Binn.) and *Pisonia spathiphylla* K. Schum., and the lack of corresponding fruiting material from the Solomon Islands, we have hesitated to give these more than a provisional designation.

**Ceodes urocarpa** sp. nov.

Arbor parva; ramulis griseis, glabris; foliis ellipticis ad obovato-ellipticis, (in specimine) 12–31 cm. longis, 6–11 cm. latis, paullo supra dimidiam latissimis, basim versus cuneatim angustatis, apice obtusis ad acutis, chartaceis, in sicco supra nigrescentibus, subtus pallidioribus; nervis primariis utrinque 8–11, undique perspicuis, intra marginem arcuatim confluentibus; petiolo 1.2–2.5 cm. longo; inflorescentiis terminalibus axillaribusque, laxe paniculatis, divaricate ramosis, foliis brevioribus; pedunculo 1–3 cm. longo, glabrato; ramulis ultimis et pedicellis floribusque indumento pulverulento brunneis; floribus ♂ (immaturis) ad apicem ramulorum ultimorum umbellatim congestis; perianthio  $\pm$  3 mm. longo, 5-lobulato; staminibus 4, tubo perianthii aequilongis; filamentis glabris; antheris suborbicularibus; stylo filamentis fere aequilongo; stigmatibus vix fimbriatis; floribus ♀ non visis; fructibus lanceolato-teretibus, basi in stipitem paullo productis, apice in rostellum longissimum filiformem in sicco vix sulcatum abientibus, summo apice perianthii limbo vix aucto coronatis; fructu cum stipite rostelloque ad 60 cm. longo, immaturo sine rostello 2 cm. tantum, supra basim 1 cm. lato; pedicello fructifero 1–1.5 cm. longo.

SOLOMON ISLANDS: Ulawa Island, *Brass* 2972 (type), October 6, 1932, common in littoral rain-forests (small trees with smooth shining somewhat fleshy leaves; the long green tail-like appendage of the fruit very viscid. Quite large birds are frequently entangled and held by the viscid fruit).

Particularly in the long rostellate fruits, but also somewhat in the outline of the leaves, the species suggests *Ceodes longirostris* (Teysm. & Binn.), but it appears to be quite distinct by the much narrower leaf-base and the much longer petiole.

## LEGUMINOSAE

(E. G. BAKER)

**Adenanthera novo-guineensis** Bak. fil. sp. nov.

Arbor parva  $\pm$  14 m. alta ad *A. pavoninam* L. accedens, differt primo intuitu pedicellis brevioribus hirtis, seminibus fere omnino rubris  $\pm$  5 mm. longis, conspicue minoribus, leguminibus contortis nec falciformibus, petalis brevioribus. Folia bipinnata 23–27 cm. longa; pinnae 4–5-jugae, 10 cm. longae; foliolis alternis utrinque 5–7 brevissime petiolulatis, oblongis vel ovato-oblongis, apice obtusis vel emarginatis, basi rotundatis, 15–28 mm. longis, 10–15 mm. latis, subtus adpresse et sparse pubescentibus. Flores lutei, in multifloros racemos dispositi.

Pedicelli  $\pm$  1 mm. longi, hirti. Petala  $\pm$  3 mm. longa lanceolata vel oblongo-lanceolata. Stamina exserta. Ovarium hirtum. Legumen oblongo-lineare contortum,  $\pm$  10 cm. longum, 13–16 mm. latum, 10–13-spermum seminibus fere omnino rubris levissime apicem versus nigris  $\pm$  5 mm. longis.

Type, *L. J. Brass* 8367, collected Nov. 1936 at Gaima, Lower Fly River (east bank), Western Division, British New Guinea; rain-forest outskirts; tree 14 m. high, flowers yellow. Type in British Museum (Natural History). Also: Lake Daviumbu, Middle Fly River, *Brass* 7763; small canopy tree, common in light rain forest.

Differs from *A. pavonina* L. by the shorter pedicels and conspicuously smaller seeds which are nearly all red but just tipped with black; from *A. borneensis* Brace by the blunt apices of the leaves; from *A. Forbesii* Gagnep. by the much larger leaflets and from *A. atosperma* F. Muell., *A. intermedia* Merr., *A. aglaosperma* Alston and *A. microsperma* Teijs. & Binn by the seed being of different shape, only just tipped with black and 5 mm. long.

#### RUTACEAE

**Zanthoxylum torvum** F. v. Muell. Fragm. 7: 140. 1871; F. M. Bailey, Queensl. Fl. 1: 205. 1899; Merr. Enum. Philip. Fl. Pl. 2: 327. 1923.

*Fagara torva* Engler in Engler & Prantl, Nat. Pflanzenfam. 3(4): 119. 1895; Merr. Interpret. Herb. Amboin. 288. 1917.

BRITISH NEW GUINEA: Central Division, Ononge Road, Dieni, *Brass* 3833, April 21, 1933, at 500 m. alt., rain-forest (very slender, high climbing liane with very glossy pinnate leaves paler beneath; fruit red; seeds shining, black); Lower Fly River, east bank opposite Sturt Island, *Brass* 7983, October, 1936, rain-forest canopy (liane common on drier ridges; stem and branches thorny).

These specimens are a good match for the collections from Amboina. The lower surface of the leaves tends to be pubescent along the nerves, and the leaf-serrations are somewhat variable. The species has been found in Australia, Amboina, Java, and the Philippines.

**Flindersia amboinensis** Poir. in Lam. Encycl. Suppl. 4: 650. 1816; C. DC. Monog. Phan. 1: 735. 1878; Merr. Interpret. Herb. Amboin. 291. 1917.

*Flindersia radulifera* Spreng. Gesch. Bot. 2: 76. 1818.

BRITISH NEW GUINEA: Central Division, Kubuna, *Brass* 5565, November, 1933, at 100 m. alt., common in ridge-forests; Mafulu,



*Brass* 5339, oak forest, at 1250 m. alt. (heavy boled tree with pale brown, fissured bark; leaves very glossy; flowers small, red); Western Division, Upper Wassi Kussa River (left branch), *Brass* 8634, January, 1937, rain-forest canopy; Lower Fly River, east bank opposite Sturt Island, *Brass* 8032, October, 1936, rain-forest, one of the commoner large trees of dry ridges inland from the river; Lake Daviumbu, Middle Fly River, *Brass* 7517, August, 1936, rain-forest, common.

This species was based on the Rumphian description and plate of *Arbor radulifera* Rumph. Herb. Amb. 3: 201, *t.* 129. 1743, which in turn was based on Amboina specimens (not Ceram as indicated by C. de Candolle). It is cultivated in the Botanic Gardens at Buitenzorg. Hemsley reports a fruit cast up on the coast of Aru Island. It seems probable that it is rather widely distributed in the Moluccas and New Guinea.

*Brass* describes this as a common spur-buttressed tree of the ridge-forests, 20–30 m. tall, with bark gray-brown to brown outside, yellow within, fissured horizontally and exfoliating in small scales; leaves dark green with pale nerves; flowers red; and fruit (in *Brass* 7517 solitary on peduncles, pendent) 5-valved, valves 11.5–15 cm. long, 2 cm. broad.

Our material seems to correspond fairly well with the description of *Flindersia amboinensis* Poir. Rumphius indicated that the flowers appeared in December, and the fruit-valves were 5–6 inches long. *Brass* 8634 (with flowers) was collected in January. Briefly, the flowers are red; the calyx pubescent; the sepals 5, rounded-ovate,  $\pm$  1 mm. long; the petals obovate-oblong, glabrous,  $\pm$  3.5 mm. long; the filaments shorter than the petals, thickish; the anthers broadly ovate-cordate; the staminodia a little longer than the disc, acute; and the ovary pubescent.

Without examining the actual fruit of *Flindersia papuana* F. v. Muell. from the Fly River, we cannot say whether any of our material represents that species. Both *F. Bennettiana* and *F. Oxleyana* which von Mueller says are "not dissimilar . . . in tubercular roughness," have capsules with large and small tubercles; whereas, the protuberances or tubercles of the fruits in these collections (cited as *F. amboinensis* above) are fairly regular in size, much like those on the fruit-valves of *F. australis* R. Br. but somewhat blunter.

### ***Flindersia heterophylla* sp. nov.**

Arbor 20 m. alta; ramulis cinereo-fuscis; foliis suboppositis, 1–4-foliolatis, rachi 3–8 cm. longa; foliolis suboppositis, subcoriaceis, 5.5–13 cm. longis, 2–6.8 cm. latis, ellipticis, coriaceis, breviter petiolulatis (petiolulis 2–5 mm. longis), apice abrupte obtuseque breviter

acuminatis vel obtusis, basi cuneatis vel acuminatis, supra nitidis, utrinque glabris, margine integris; costa media utrinque prominula praecipue basim versus; venulis primariis  $\pm 9$ , inconspicuis; paniculis amplis; pedunculis secundariis oppositis; ramulis glabratibus; alabastris pubescentibus; floribus rubris; sepalis late ovatis, 0.7 mm. longis; petalis obovato-oblongis, 2 mm. longis, undique pubescentibus; filamentis crassis, 0.8 mm. longis, dorso pubescentibus; antheris cordatis; staminodiis inconspicuis; ovario hirsuto; capsulis  $\pm 5.5$  cm. longis; valvis dorso verrucosis, leviter tuberculatis; seminibus  $\pm 4.3$  cm. longis, ellipticis, utrinque alatis.

BRITISH NEW GUINEA: Western Division, Wassi Kussa River, Tarara, *Brass* 8495 (type, fruiting branchlet), 8542 (flowering branchlet), December, 1936 and January, 1937, common in rain-forest (canopy tree attaining 20 m., with close brown bark marked with shallow horizontal fissures; wood pale, tough; leaves 1–2–3 or 4-foliolate; flowers red).

Without actual material for comparison, we believe this species is perhaps most nearly related to *Flindersia Brayleyana* F. v. Muell. It differs, however, in its less numerous and more nearly sessile leaflets, different colored flowers, less pointed anthers (cf. Engler & Prantl, Nat. Pflanzenfam. 3[4]: 171, f. 99J-Q. 1895), and more shortly pubescent filaments, as well as in the shorter and inconspicuous staminodia. The capsule also seems to be different; in our species the boundary lines of the incipient tubercles are somewhat indefinite and the surface tends to show irregular rounded ridges or mounds rather than the definite pointed tubercles characteristic of the related species.

***Flindersia brachycarpa* sp. nov.**

Arbor  $\pm 25$  m. alta; ramulis cylindricis, atro-fuscis; foliis oppositis vel suboppositis, pari-pinnatis, 8–10-foliolatis, rachi (incl. petiolo) 12–19 cm. longa; foliolis oppositis, subcoriaceis, conspicue petiolulatis (petiolulis 7–9 mm. longis), inaequilateraliter lanceolato-ellipticis, 6–11 cm. longis, 3–4 cm. latis, subacutis, basi rotundato-cuneatis, utrinque glabris, margine integris; venis primariis usque ad 20, supra inconspicuis, subtus perspicuis sed non prominulis; paniculis amplis, pedunculis secundariis oppositis, ramulis pubescentibus; alabastris pubescentibus; sepalis ovatis,  $\pm 1$  mm. longis; petalis oblongis,  $\pm 2.5$  mm. longis, intus glabris; staminibus brevibus; filamentis 0.4 mm. longis, antheris ovatis, apiculatis; staminodiis 5, 0.4 mm. longis, acutiusculis; disco undulato; capsulis 5.5–6 cm. longis; valvis dorso obtuse et breviter tuberculatis; seminibus ignotis.

BRITISH NEW GUINEA: Western Division, Wassi Kussa River, Tarara, *Brass* 8389 (type), December, 1936, rain-forest (important canopy tree 25 m. tall; stem cylindrical; bark dark, very thick, rough and fissured; wood yellow; rachis of leaves decurrent; flowers white; capsules brown, pubescent).

This species strongly suggests *Flindersia Ifflaiana* F. v. Muell. It differs in having larger leaves with the leaflets strongly oblique at the base and more acute at the apex, and a little larger fruits.

## AQUIFOLIACEAE

### *Ilex cristata* sp. nov.

Ramuli cinerei usque gilvi, novelli  $\pm$  angulati, fusci, copiose puberuli; foliis coriaceis, 2–3 cm. longis, 0.9–1.3 cm. latis, ovatis, basi late obtusis usque cuneatis, apicem versus paullo angustatis, apice late acuminatis, margine fere integris, apicem versus 2–4-serrulatis, in sicco supra fuscis, subtus pallidioribus et consperse glandulosis, costa media supra canaliculata, subtus prominula; venis primariis obscuris; petiolo 3–4 mm. longo; inflorescentiis in foliorum axillis solitariis vel plerumque racemosis, rachi  $\pm$  5 mm. longa, pedicellis 2 mm. longis, basi bracteatis, bracteis late ovatis, circiter 0.5 mm. longis; sepalis 5, persistentibus; drupis depresso-ovoideis usque subglobosis, circiter 3 mm. diametro, parte inferiore farinacea, stigmate prominulo oblongo (2 mm. longo, 0.5 mm. lato) coronatis, circa 18-pyrenis; pyrenis convexo-trigonis, 1.5 mm. longis, 1 mm. latis (immaturis).

NORTHEASTERN NEW GUINEA: Torricelli-Gebirge, *Schlechter* 20180 (type), September 11, 1909, at 800 m. alt.

The label of the above cited specimen bears the determination *Bulbophyllum quinquelobum* Schlecht.; this is undoubtedly a clerical error as Schlechter's type is no. 20188 of this same series.

A comparison of *Ilex cristata* with the description of *I. pseudo-embelioides* Loes. suggests that our species is closely allied. It differs, however, in having less conspicuous leaf-venation, racemose inflorescences, and a rather distinctive stigma resembling a narrow and slightly elongated crest-like ridge at the apex of the drupe.

### *Ilex Archboldiana* sp. nov.

Arbor usque ad 15 m. alta; ramis dense foliatis, subteretibus (fere angularibus), cineraceis, novellis fuscis et saepe puberulis; foliis valde coriaceis, nitidis, 1.5–3.5 cm. longis, 1–2 cm. latis, obovatis ad ellipticis, basi late subcordatis, apice obtusis vel retusis, interdum mucronulatis, margine integerrimis valde revolutisque, glabris, supra viridibus, subtus

pallidioribus; nervis primariis utrinque 3-4, prominulis vel indistinctis; petiolo circiter 5 mm. longo, minute puberulo, fusco; floribus ♀ solitariis vel inflorescentiis 3-5-floris (cymoso-umbellatis) in axillis foliorum superiorum, pedunculo  $\pm$  6 mm. longo, puberulo; pedicellis circiter 3 mm. longis, puberulis; sepalis 5, rotundis, puberulis; baccis subglobose, in sicco 3-4 mm. diametro, 4-pyrenis.

BRITISH NEW GUINEA: Central Division, Mount Tafa, *Brass 4118*, 4897 (type), May-September, 1933, at 2300-2400 m. alt., common in ridge-forests; Wharton Range, Murray Pass, *Brass 4601*, June-September, 1933, at 2480 m. alt.

According to Brass this is a compact densely foliated tree with very stiff, smooth, shining convex leaves; fruit 4-5 mm. diameter, subglobose, and red with red seeds.

*Ilex Archboldiana* closely approaches *I. revoluta* Stapf from Borneo in general habit; nevertheless, it may be distinguished by the grayish white branchlets, the fuscous puberulent branchlets (new growth), and the entire leaves not glandular-punctate beneath. The ♀ inflorescence is axillary and consists of a solitary flower (incipient umbel, the two bracts on the peduncle indicating abortive flowers), or flowers in umbels of 3, or occasionally a cymose umbel with 4-5 flowers.

***Ilex Brassii* sp. nov.**

Arbor usque ad 20 m. alta; ramis teretibus, atro-cinereis; foliis coriaceis, 5-9 cm. longis, 3-5.5 cm. latis, ellipticis, basi  $\pm$  rotundatis vel obtusis, apice breviter lateque acuminatis usque obtusis, margine integris; costa media supra canaliculata, subtus prominente; venis primariis utrinque  $\pm$  6, prope margine arcuatis, supra inconspicuis, subtus vix prominulis; petiolo  $\pm$  1 cm. longo; inflorescentiis ♂ axillari-bus, 2 cm. longis, paniculatis; floribus racemosis vel subumbellatis, 4-meris; calyce patelliformi, lobis rotundatis, minute ciliolatis; petalis oblongis; staminibus petalis paullo brevioribus; antheris oblongis; pistillodio conico.

BRITISH NEW GUINEA: Gaima, Lower Fly River (east bank), *Brass 8291* (type), November, 1936, common about margins of sago-swamps in the rain-forest (tree 20 m. high; bark thick, gray, suberose, fissured, green when cut; most trees in young bud). NORTHEASTERN NEW GUINEA: Sattelberg, *Clemens 3034*.

This species somewhat resembles *Ilex Ledermannii* Loes. var. *elliptica* Loes. in habit; but the ♂ inflorescence has a much shorter peduncle than that of the ♀ inflorescences in our material of the above named variety; the latter also appears (from the calyx on the fruit) to have a 5-merous flower.



## CELASTRACEAE

**Gymnosporia inermis** sp. nov.

Frutex magnus, 3 m. altus, glaber, scandens; ramulis fusco-cinereis, divaricatis; foliis 3.5–8 cm. longis, 2–5 cm. latis, obovatis, apice rotundatis vel retusis, basi cuneatis ad  $\pm$  rotundatis, margine crenulatis; costa media venisque primariis (utrinque  $\pm$  5–6) utrinque prominulis, venulis laxe reticulatis, fere prominulis; petiolo 3–8 mm. longo; inflorescentiis in foliorum axillis solitariis vel in ramulorum abbreviatorum apice 1–5, saepe bis dichotome furcatis, pedunculatis, pedunculis  $\pm$  1 cm. longis, pedicellis ultimis  $\pm$  4 mm. longis; bracteis lanceolatis; floribus 5-meris, sepalis semi-orbicularibus; petalis oblongo-ovatis, obtusis, circiter 2.5 mm. longis; capsula trivalvi, valvis  $\pm$  7 mm. longis; loculis 2-spermis (immaturis).

BRITISH NEW GUINEA: Western Division, Wassi Kussa River, Tarara, *Brass* 8690 (type), January, 1937, common in inner mangroves (stiff scandent shrub; flowers white; fruit immature); Daru Island, *Brass* 6229, March 29, 1936, on slightly raised ridge of drift sand in outer mangrove forest (large shrub 3 m. tall, of straggling habit; flowers white; fruit red, 3-angled).

This material suggests *Gymnosporia spinosa* (Blanco) Merr. & Rolfe, but lacks the spines of the latter species.

**Kurrimia Archboldiana** sp. nov.

Arbor glabra; foliis coriaceis, alternis, 9–18 cm. longis, 4.5–8 cm. latis, ellipticis, apice obtusis vel rotundatis, basi  $\pm$  rotundatis, margine integerrimis, leviter revolutis, supra lucidis, subtus pallidis; costa media venisque primariis utrinque 9–11, supra subtusque conspicuis; petiolo 1.5–3 cm. longo; racemis axillaribus foliis parum brevioribus; folliculis 2–2.5 cm. longis, circiter 8–9 mm. latis, oblongo-cylindraceis, apice attenuatis, basi angustatis; pedicellis  $\pm$  3 mm. longis; semine plerumque 1, interdum 2, ellipsoideo.

BRITISH NEW GUINEA: Western Division, Middle Fly River, Lake Daviumbu, *Brass* 7754 (type), 7495, September and August, 1936, common in rain-forest canopy layer (tree 25 m. tall, with hard brown fissured bark; petioles and leaf-nerves white; fruit smooth, yellow, aril orange-colored).

This species strongly suggests *Kurrimia pulcherrima* Wall. ex Lawson; however, the leaves are less tapering at the apex, the primary veins are farther apart ( $\pm$  1 cm.) and the follicles are shorter and much more abruptly attenuate at the apex. The genus is apparently new to the Papuan flora.

***Elaeodendron mindanaense*** Merr. Philip. Jour. Sci. Bot. **12**: 277. 1917, Enum. Philip. Fl. Pl. **2**: 484. 1923.

BRITISH NEW GUINEA: Western Division, Wassi Kussa River, Tarara, *Brass* 8685, common in underbrush of light rain-forests (tree 6–7 m. high; flowers green); Daru Island, *Brass* 6257, in light rain-forest fringing a mangrove creek (tree 15 m. high; bark pale brown, corky, with a red blaze; flowers small, green; fruit soft, white, compressed,  $\pm$  5–6 mm. long, 4–5 mm. in diameter).

These two collections appear to be a very good match for the type-collection of *Elaeodendron mindanaense* Merr., a species previously considered endemic to the Philippines, except that some of the leaves of *Brass* 8685 are a little larger. On the other hand, they scarcely seem to differ from our meager material of *E. microcarpum* White & Francis, collected in southeastern Queensland; at present, the latter seems very doubtfully distinct from the former.

***Perrottetia grandifolia*** Ridley, Trans. Linn. Soc. Bot. ser. 2, **9**: 30. 1916.

*Perrottetia Schlechteri* Loesener, Notizbl. Bot. Gard. Berl. **12**: 37. 1934.

*Perrottetia Lauterbachiana* Loesener, op. cit. 36 (incl. forma  $\beta$ . *macrophylla* Loes.).

NORTHEASTERN NEW GUINEA: Yunzaing, *Clemens* 2968, 3637; Ogeramnang, *Clemens* 6906; Kulunghifu, *Clemens* 6552. Described from the Netherlands New Guinea.

In the process of identifying the unnamed Celastraceae from New Guinea, we find ourselves unable to differentiate between Loesener's two species cited in synonymy and Ridley's *Perrottetia grandifolia*. Loesener points out that his *P. Schlechteri* agrees with Ridley's species except for the length of the petiole and the size of the inflorescence. The length of the petiole (1 mm.) as given in Ridley's original description is quite likely a typographical error and the inflorescence (from the description) seems to be very young. The collections from New Guinea differ from our meagre material of *P. moluccana* (Bl.) Loesener in that the leaves of the latter are remotely and minutely crenate-denticulate. The peduncle of the inflorescence is 3.4 cm. long; this is not longer than the maximum length given for *P. Schlechteri* Loes., but it is about twice as long as that in *Schlechter* 16808, 17325, or in any of the specimens we have cited.

#### HIPPOCRATEACEAE

***Salacia subalternifolia*** sp. nov.

Scandens, glaber; ramulis subteretibus vel compressis, lenticellatis;

foliis alternis vel suboppositis,  $\pm$  1 cm. longe petiolatis, coriaceis, ellipticis, apice obtusis vel  $\pm$  rotundatis, basi rotundatis usque cuneatis, margine subintegris, 9–15 cm. longis, 4.5–8 cm. latis; costa media venisque primariis utrinque 5–6, utrinque prominulis; venis tenuissimis laxe reticulatisque, praecipue subtus prominulis; inflorescentiis axillari-bus, cymoso-paniculatis,  $\pm$  2 cm. longis; bracteis deltoideis, fimbriatis; pedicellis ultimis 7–10 mm. longis; alabastris ovoideo-globosis, circiter 2 mm. diametro; floribus expansis circiter 7 mm. diametro; sepalis 5, semi-rotundatis, saepe erosis vel ciliolatis; petalis rotundato-ellipticis, 2 mm. longis; staminibus 3 vel 4, supra et intra discum crassum (2 mm. latum) insertis, filamentis vix 0.5 mm. longis latisque, com-planatis, apicem versus angustatis; antheris erectis vel recurvis, filamentis paullo angustioribus, apice transverse dehiscentibus; ovario infra discum 3-angulato, stylo brevissimo vel nullo, stigmate parvo; loculis 3 vel interdum 4, 2-ovulatis; fructibus subglobosis, duris, usque 5 cm. dia-metro (fide Brass); pericarpio subligneo,  $\pm$  5 mm. crasso; seminibus 3 ( $2 \times 2.5 \times 1.5$  cm.), dorso convexis, intra faciebus (2–)3; testa fusca; cotyledonibus molem firmam formantibus.

BRITISH NEW GUINEA: Lower Fly River, east bank opposite Sturt Island, *Brass 8066* (type), October, 1936 (large liane climbing to the top of rain-forest trees; flowers green; fruit orange-brown, spherical, up to 5 cm. in diameter).

This species is perhaps an affinity of *Salacia viminea* Lawson, differing in its larger and coriaceous leaves and in its axillary compound cymes; and from most other species in its alternate to subopposite leaves.

#### RHAMNACEAE

**Zizyphus inermis** Merr. Govt. Lab. Publ. (Philip.) **35**: 37. 1906, Enum. Philip. Fl. Pl. **2**: 522. 1923.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass 7180*, July, 1936, at 100 m. alt., in forests of higher ridges (slender spur-buttressed canopy tree 30 m. high; bark thin, brown; fruit red, fleshy, 1–1.2 cm. in diameter). SOLOMON ISLANDS: Kugumaru, Buin, *Kajewski 1826*, June 7, 1930, rain-forest (large tree up to 25 m. high; fruit brownish green when ripe, almost globular, 1.3 cm. long, 1.3 cm. in diameter); Marmaromino, *Kajewski 2197*, September 29, 1930, rain-forest, common (small tree up to 10 m. high; fruit narrowed at base, widening at centre and coming to a blunt point, orange-colored when ripe, 1.5 cm. long, 1.2 cm. in diameter at widest base). Previously reported from the Philippines and the Celebes.

With only the brief original description of *Zizyphus Forbesii* Bak. f. (*Forbes*, New Guinea), for comparison, we have been unable to separate the species from the Philippine *Z. inermis* Merr.; hence, for the present we have placed our Papuan material with the latter species.

***Zizyphus oligantha* sp. nov.**

Frutex scandens; ramulis aculeatis, pubescentibus; foliis inaequaliter ovatis, 5–8 cm. longis, 2.5–3.5 cm. latis, acutis vel obtuse acuminatis, basi oblique subrotundatis, supra venis exceptis glabris, subtus fusco-pilosis, chartaceis, crenulato-serrulatis, 3(–5)-nerviis, nervis lateralibus marginem versus ramosis, venulis et nervis subtus prominulis; petiolo 7–8 mm. longo, piloso; stipulis spinescentibus, altera uncinata, altera recta deciduaque; cymis axillaribus, paucifloris, sub maturitate petiolum subaequantibus; floribus pedicellatis, pedicellis 3–4 mm. longis; calycis lobis deltoideis, subacutis, 1.4 mm. longis, extus pilosis, intus carinatis, glabris; petalis cucullatis, glabris, stamina includentibus, calyci subaequilongis; disco  $\pm$  5-angulato; ovario glabro; fructibus glabris, obovatis usque subglobosis,  $\pm$  7 mm. longis, biocularibus.

BRITISH NEW GUINEA: Western Division, Mabaduan, *Brass 6488* (type), April, 1936, common in rain-forest undergrowth (large scrambling shrub; flowers small, green; fruit subglobose, black, fleshy, 7–8 mm. in diameter).

The leaves of this species suggest *Zizyphus djamuensis* Lauterb., but the former may be readily distinguished by the much shorter (at anthesis about half as long as the petiole) and fewer-flowered cymes, the sparser pubescence and the glabrous ovary.

***Alphitonia ferruginea* sp. nov.**

Arbor; ramulis tomentosis; foliis alternis, lanceolato-ellipticis, apice acutis, basi rotundatis, vix cordatis, 10–15 cm. longis, 4–6.5 cm. latis, supra glabris, subtus ferrugineo-tomentosis; costa media supra impressa, subtus conspicua; venis primariis utrinque circiter 14–16, conspicuis; petiolo 1–1.5 cm. longo, tomentoso; inflorescentiis cymosis, in ramulis lateralibus foliatis terminalibus axillaribusque; rachi, ramulis, floribus ferrugineo-tomentosis; sepalis 5, triangularibus; petalis 5, cucullatis; disco 5-angulato; ovario tomentuloso; stylo trifido; fructibus glabrescentibus, vix 1 cm. altis; coccis 3.

BRITISH NEW GUINEA: Central Division, Mount Tafa, *Brass 4935* (type), *4082a*, April–September, 1933, at 2400 m. alt., common tree of second growth in the forest.



*Alphitonia ferruginea* differs from *A. moluccana* Teijs. & Binn. ex Braid in that the ferrugineous tomentum of the leaves and the inflorescence persists; the inflorescence has larger buds (3 mm. in diameter) and flowers (sepals 2 mm. long, open flowers 7 mm. in diameter) than *A. moluccana* (buds about 2 mm. in diameter, open flowers 3–5 mm. broad), and the pubescence of the flower-buds is so thick that the buds appear globular rather than obtusely angled as in the related species.

## TILIACEAE

**Berrya papuana** sp. nov.

Arbor 20 m. alta; ramulis minute stellato-pubescentibus vel sublepidotis; foliis late ellipticis vel subrotundatis, 6–11.5 cm. longis, 4.5–9 cm. latis, apice late obtusis vel subrotundis, basi subcordatis, subintegris, membranaceis vel subcoriaceis, glabris vel subtus in axillis nervorum venarumque barbulatis; nervis basalibus 3, lateralibus reliquis circiter 5–8, subtus venulis sub lente perspicuis; petiolo 2–3 cm. longo, glabro vel sparse sublepidoto; inflorescentiis terminalibus, in fructu usque ad 12 cm. longis, ramosis, stellato-pubescentibus; alabastris oblongo-ovovatis; floribus  $\pm$  7 mm. longis, roseis; calyce fere ad basim irregulariter fisso ( $\pm$  3-lobato), dense stellato-puberulo; petalis oblongis, versus basim angustatis; staminibus  $\pm$  60, ima basi connatis; filamentis filiformibus, petalis brevioribus; antheris peltatis oblongis, rima longitudinali apicali dehiscentibus; ovario 5-loculari (loculis 3–5-ovulatis), dense stellato-pubescente; stylo glabro; stigmate punctiformi; capsula 1.5 cm. alta, 3 cm. diametro, 5-loculari, scabra; alis 10 fere horizontaliter patentibus, 1.5–1.7 cm. longis, nervosis; carpellis ventre totis connatis; semine uno in quoque loculo, pendulo.

BRITISH NEW GUINEA: Central Division, Nakeo District, Baroka, *Brass 3740* (type), April, 1933, at 30 m. alt. in the rain-forest (pyramidal tree, 20 m. tall; trunk corrugated; bark flaky; wood hard, brown; flowers pink; fruit pale green).

This species is manifestly very closely allied to *Berrya javanica* (Turcz.) Burret, but differs in the smaller leaves, the somewhat smaller flowers and the obtuse flower-buds. The seed cavities in the fruit are about half as high as those in the fruit of *B. javanica* (Turcz.) Burret and united to the apex; in the latter species the union of the carpels is very little more than half as high as the seed-cavities.

We have spelled the name of this genus (*Berrya*) according to that found in the list of Nomina Conservanda, rather than the original spelling (*Berria*).

**Trichospermum Peekelii** Burret, Notizbl. Bot. Gart. Mus. Berl. 9: 853. 1926.

SOLOMON ISLANDS: Bougainville Island, Kugumaru, Buin, *Kajewski* 1855, June 11, 1930, rain-forest, at 150 m. alt., common (large tree up to 20 m. high; fruit 2 cm. long, 2.2 cm. broad, 1 cm. thick. The inner fibre is used for making a strong kind of string and very durable cordages of varying sizes). Type from the Bismarck Archipelago.

By comparison with the original description and a fragment of material determined by Burret, there can be little doubt that this collection represents *Trichospermum Peekelii* Burret; however, it is to be noted that the lower surface of the leaves is densely pubescent in both the flowering and the fruiting material; further, in both the flower-buds and the fruits only two placenta appear. The leaves are approximately 30 cm. long (the apex is broken and ragged in all) and 13 cm. wide. The capsule is bivalvate with a narrow-winged margin and a single locule; the valves are somewhat reniform-retuse, 1.5–2 cm. high,  $\pm$  2.2 cm. broad; the seeds are scarcely 1 mm. in diameter, and the surrounding hairs are whitish.

**Trichospermum incanum** sp. nov.

Arbor usque ad 20 m. alta; ramulis glabris; foliis ellipticis, usque 20 cm. longis, 11.5 cm. latis, basi late rotundatis, apice acutis, margine minute denticulatis, supra in sicco brunneis, subtus canescentibus (dense minuteque stellato-pubescentibus), undique praecipue in costa nervisque sparse hirsutis; nervis basalibus 3, lateralibus supra basin circiter 8; petiolo 1.5 cm. longo, hirsuto; inflorescentiis (in fructu tantum) usque ad 13–15 cm. longis; pedunculo glabrato; ramulis pedicellis (vix 1.5 cm. longis) stellato-pubescentibus etiam sparse hirsutis; capsulis margine alatis, unilocularibus; valvis 2–2.5 cm. altis, 3.5 cm. latis, atro-brunneis, dense stellato-pubescentibus, pilis minutis et paullo longioribus; seminibus circiter 2 mm. diametro.

SOLOMON ISLANDS: Bougainville Island, Kugumaru, Buin, *Kajewski* 1829 (type), June 7, 1930, rain-forest, at 150 m. alt., common.

At the junction of the leaf-blade and the petiole are two obvious glands ( $\pm$  2 mm. in diameter). The species has leaves about the same size as those of *Trichospermum calyculatum* (Seem.) Burret, but the stipules are deciduous, the sparse hirsuteness of the leaves is persistent and the fruits are much larger.

**Trichospermum Kajewskii** sp. nov.

Arbor usque ad 20 m. alta; ramulis minute stellato-pubescentibus; foliis ellipticis, 11–15 cm. longis, 6–7 cm. latis, utrinque fere aequaliter

angustatis, margine denticulatis, undique conperse minutissimeque stellato-pubescentibus, concoloribus; nervis basalibus 3, lateralibus supra basim utrinque circiter 6; petiolo 1.5–2 cm. longo, dense stellato-pubescente; inflorescentiis axillaribus, usque ad 8 cm. longis; pedunculis sparse, ramulis pedicellisque dense stellato-pubescentibus; floribus ♀: sepalis 10–11 mm. longis, petalis 9 mm. longis, oblongis, apice retusis, intus basi excepta pilis hirsutis aream glanduligeram cingentibus, ceterum glabris; gynaeceo 5 mm. alto, biloculo, dense stellato-hirsuto; stylo brevi; stigmate bilobo, lobis  $\pm$  flabellatis, margine irregulariter lobulatis.

SOLOMON ISLANDS: Guadalcanal Island, Oulolo, Tutuve Mountain, *Kajewski* 2555 (type), April 22, 1931, rain-forest, at about 1200 m. alt., common (tree small in diameter but with trunk up to 17 m. tall; petals green).

In the size of the leaves and the general habit of the collection this species suggests *Trichospermum Richii* (A. Gray) Seem. but the leaves of the latter are broader at the base and the two glands at the junction of the blade and the petiole are lacking or inconspicuous; in *T. Kajewskii* these glands are conspicuous.

***Trichospermum psilocladum* sp. nov.**

Arbor 10–20 m. alta; ramulis glabris, levibus; foliis ellipticis, 11–20 cm. longis, 5–9.5 cm. latis, apice breviter acuminatis, basi late rotundatis vel leviter cuneatis, margine crenulato-denticulatis, in costa nervisque primariis minutissime stellato-pubescentibus vel sub lepidotis, ceterum glabris; nervis basalibus 3, lateralibus supra basim utrinque circiter 7; petiolo  $\pm$  2 cm. longo, fere glabro; inflorescentiis axillaribus, usque ad 10 cm. longis, pedunculis ramulisque glabris, pedicellis 5–7 mm. longis, glabratis vel minutissime stellato-pubescentibus; alabastris stellato-pubescentibus; floribus ♂: sepalis lanceolatis, 1 cm. longis, intus pubescentibus; petalis oblongis, apice  $\pm$  rotundatis vel retusis, basim versus paullo angustatis, intus basi corona pilorum aream glanduligeram 0.5 mm. altam cingente; androgynophoro 1–1.5 mm. alto, margine hirsutulo; staminibus 5 mm. longis, antheris circiter 1 mm. longis; gynaeceo 2 mm. alto, glabro, basi tantum stellato-pubescente; stylo nullo; stigmate crenate lobato; floribus ♀: sepalis circiter 9 mm. longis; petalis oblongis, apice obtusis, intus basi pilis hirsutis aream glanduligeram cingentibus exceptis glabris; staminibus vix 1 mm. altis, antheris abortivis; gynaeceo vix 4 mm. alto, ovario stellato-pubescente, stylo brevissimo, stigmate bilobo, flabellato; capsulis unilocularibus, bialatis, minutissime stellato-pubescentibus, valvis reniformibus, 1.3 cm. altis, 2 cm. latis; placentis 2 tantum, oppositis.

SOLOMON ISLANDS: Guadalcanal Island, Berande River, *Kajewski* 2402 (type, ♀), January 1, 1931, common in rain-forest; Malaita Island, Quoimonapu, *Kajewski* 2342 (♂), December 11, 1930, common in rain-forest; San Cristoval Island, Waimamura, *Kajewski* 2859, September 12, 1932, in old garden clearing.

In all these specimens the leaves have two little pouch-like glands at the base of the lamina. The natives use the fibrous inner bark for making string bags, plaiting couches, etc. (fide *Kajewski*).

Superficially the species closely resembles *Trichospermum Inmac* (Guill.) Burret. Technically it differs in being dioecious, both sterile and fertile flowers having respectively a rudimentary pistil and rudimentary stamens. The style in both *T. Inmac* (Guill.) Burret and *T. psilocladum* is very short, but in the former the stigma is more elongate and incised, whereas, in the latter the two-lobed stigma is almost sessile, each lobe being flattened and crenately orbicular.

***Microcos tetrasperma* sp. nov.**

Arbor 20 m. alta; ramulis teretibus, atrofusis, glabris vel sparse minuteque lepidotis; foliis coriaceis, late oblongis ad ellipticis, 15–19 cm. longis, 5.5–7 cm. latis, basi rotundatis, paululo obliquis, apice acutis, margine integris, undique in sicco olivaceo-brunneis, nitidulis, costa media nervisque minute lepidotis, ceterum glabris, nervis basalibus 3 quorum lateralibus paullo supra basim laminae orientibus, alte ascendentibus et  $\frac{2}{3}$ – $\frac{3}{4}$  laminae aequantibus; nervis lateralibus reliquis 3–4 in quoque latere, quorum infimo fere in media lamina oriente; venulis utrinque valde reticulatis; petiolo 2 cm. longo, a medio superne paullo incrassato, glabro ad minute lepidoto; stipulis linearibus, caducis; inflorescentiis terminalibus axillaribusque, paniculatis (?), in fructu  $\pm$  7 cm. longis; fructibus obovoideis, 2.5 cm. longis, 2.2 cm. diametro, 4-ocularibus, epicarpio membranaceo, glabro, levi, mesocarpio fibris tenuibus densis percurso, endocarpio osseo, circiter 1 mm. crasso; semine uno in quoque loculo.

BRITISH NEW GUINEA: Palmer River, 2 miles below Black River Junction, *Brass* 7047 (type), June, 1936, at 100 m. alt., common in ridge-forests (tree 20 m. tall; trunk flanged at the base; bark gray, lenticellate; wood yellow, coarse-grained; leaves stiff, nerves prominent especially on the lower surface; fruit obovoid, orange-yellow,  $\pm$  3 cm. long, 2.5 cm. in diameter).

The descriptions of *Microcos Schlechteri* Burret and *M. Ledermannii* Burret indicate that this is a very closely related species; it differs in having coriaceous leaves with a definitely rounded base; both the upper



and the lower surfaces dry the same color, brownish with the main nerves appearing dark reddish brown; the stipules are linear and have not yet fallen from the upper part of the vegetative shoot.

**Microcos grandiflora** Burret, Notizbl. Bot. Gart. Mus. Berl. 9: 784. 1926.

BRITISH NEW GUINEA: Fly River, 528 Mile Camp, *Brass 6658*, May, 1936, at 80 m. alt., common in the forest canopy (large tree with spur-buttressed stem and close brown bark; fruit ovate, pubescent, orange-colored,  $\pm$  5.5 cm. long, 4.5 cm. in diameter). Known only from New Guinea.

Lacking material for comparison, we have accepted *Brass 6658* (a collection in fruit only) as a reasonably good match for *Microcos grandiflora* Burret, at least as to the description of the leaves. In our specimen the largest leaves are up to 12 cm. broad, 28 cm. long, and the acumen 4 cm. long (5 mm. broad at the base and 0.5 mm. at the apex), in the type the acumen is only 2.5 cm. long. The ellipsoid or slightly obovoid fruit consists of a thin pubescent epicarp (most of the pubescence has been rubbed off), a mesocarp (1.5 cm. thick at the middle of the fruit) of very tough slender fibres, and a bony endocarp covering two locules.

**Colona scabra** (Sm.) Burret, Notizbl. Bot. Gart. Mus. Berl. 9: 800. 1926.

*Microcos scabra* Sm. in Rees Cycl. 23: n. 3. 1812-1813.

*Columbia integrifolia* Warb. Bot. Jahrb. 13: 372. 1891.

*Columbia subobovata* Hochr. Pl. Bogor. Exsicc. 25, n. 46. 1904; Merr. Interpret. Rumph. Herb. Amboin. 354. 1917.

SOLOMON ISLANDS: Guadalcanal Island, Berande, *Kajewski 2437*, January 10, 1931, rain-forest, common (medium tree, up to 20 m. high; buds covered with short silky hair, sepals greenish yellow, petals yellow spotted with maroon); Ysabel Island, Garona, *Brass 3356*, lowland rain-forests (tree with pale, fissured bark; corolla very dark mottled brown).

The species is definitely reported from Celebes, Amboina, Aru, and Palau. For a full discussion of the synonymy cf. Burret, l. c.

**Colona discolor** sp. nov.

Arbor  $\pm$  10 m. alta; ramulis atrofusis, stellato-pubescentibus ad glabratis; foliis coriaceis, oblongis, 15-19 cm. longis, 3.5-6.5 cm. latis, apice acutis ad acuminatis, basi rotundatis vel subcordatis, leviter obliquis, margine minute serratis, supra brunnescentibus, consperse minuteque stellato-pubescentibus; subtus fusco-velutinis; nervis basalibus

3, quorum 2 lateralibus dimidiam laminam aequantibus; lateralibus supra basim 6-7, ascendentibus; petiolo 7-10 mm. longo, dense pubescente; inflorescentiis terminalibus, paniculatis, in fructu 22 cm. longis, 15 cm. latis, flavido-tomentosis; capsulis indehiscentibus (?), 1.5 cm. longis latisque, 3-alatis vel 4-alatis, apice retusis ad emarginatis, corpore modice tumido.

BRITISH NEW GUINEA: Western Division, Mabaduan, *Brass* 6532 (type), April, 1936, abundant in riverine rain-forest and on grass areas deforested for gardening.

The species is somewhat similar to *Colona aequilateralis* (White & Francis) comb. nov. (*Columbia aequilateralis* White & Francis, Proc. Roy. Soc. Queensl. 38: 240, f. 7. 1927) and *C. Archboldiana*. From both *C. discolor* differs in the retuse to emarginate apex of the fruits. These are smaller than those of the first mentioned species and the wings also are much narrower.

***Colona velutina* sp. nov.**

Arbor ad 18 m. alta; ramulis ut inflorescentiis pallide flavido-hirsutis; foliis oblongis,  $\pm$  23 cm. longis, 8 cm. latis, apice obtusiuscule acuminatis, basi valde obliquis, subauriculatis, margine integris, supra brunneis (in sicco), costa media nervisque primariis hirsutulis, ceterum demum glabris; subtus flavo-viridibus vel brunnescentibus, velutinis; nervis basalibus 5-7, quorum 2 lateralibus dimidiam laminam aequantibus; lateralibus reliquis in quoque latere 6-7, curvatim ascendentibus; petiolo 1.5 cm. longo, dense hirsuto; inflorescentiis terminalibus, ramosis; alabastris globosis,  $\pm$  4 mm. diametro; sepalis oblongis, 7 mm. longis, obtusis, extus tomentosis, intus pubescentibus; petalis  $\pm$  5 mm. longis, oblanceolatis, apice rotundatis, extus sparse pilosulis, intus ad basim aream glanduligeram 0.5 mm. longam, lateraliter ut superne, ubi area glabra  $\pm$  0.5 mm. alta, corona pilorum circumcinctam gerentibus; androgynophoro longitudine aream glanduligeram aequante; staminibus  $\pm$  3.5 mm. longis; gynaeceo tomentoso, 3-5-loculari, stylo glabro; fructibus  $\pm$  2.2 cm. longis atque diametientibus, alatis (alis  $\pm$  5 mm. latis), omnino tomentosis.

SOLOMON ISLANDS: Guadalcanal Island, Konga, Ma-massa, *Kajewski* 2465 (type), February 8, 1931, rain-forest, at 500 m. alt., common (medium tree with straight trunk up to 18 m. high; all small stems, the lower surface of the leaves and the buds covered with fine hair; fruit leathery, quadrangular. The bast is used in making small baskets for carrying tobacco, betel nut, etc.).

As far as we can judge from the specimen, the fruit is indehiscent;

hence, the species belongs to the section HOLOCARPUS. It strongly suggests *Colona megacarpa* (Merr.) Burret in leaf-size and the pubescence of the fruit, but the hairs are more evenly distributed in *C. velutina*, the fruit is 3-4-winged, the leaves are gradually but not long acuminate, and the leaf-margin is entire.

***Colona Archboldiana* sp. nov.**

Arbor 7-8 m. alta; ramulis fuscis, stellato-pubescentibus ad glabratibus; foliis chartaceis, oblongis, 18-27 cm. longis, 7-9 cm. latis, apice breviter acuminatis vel longe acutis, basi subaequaliter rotundatis, margine minute serrulatis vel nervis minute projectis, supra brunnescentibus, dense in nervis sparse in facie pilis stellatis minutis praeditis, subtus velutino-canescens; nervis basalibus 3, quorum 2 lateralibus dimidiam laminam altitudine fere aequantibus, lateralibus ceteris supra basim utrinque 6-8 arcuatis ascendentibus; petiolo 1.3 cm. longo, a medio superne manifeste incrassato, dense stellato-pubescente; inflorescentiis terminalibus, paniculatis, (in specimine) circiter 20 cm. longis; floribus pedicellatis; sepalis circiter 7 mm. longis,  $\pm$  2.5 mm. latis, oblongis, acutis, extus stellato-tomentosis, intus breviter pilosis; petalis 5 mm. longis, oblanceolatis, dorso sparse pilosis, area glandulifera 0.5 mm. alta corona pilorum circumcincta; androgynophoro longitudine aequantibus glanduliferam aequante; staminibus  $\pm$  3 mm. altis; gynaeceo albidotomentoso, 3-angulato, 3-loculari, stylo basi pubescente, superne glabro; fructibus pubescentibus interdum pilis longis interspersis, fere isodiametricis, 1-1.5 cm. longis latisque, apice obtusis vel rotundatis, alis angustatis, corpore tumido.

BRITISH NEW GUINEA: Western Division, Upper Wassi Kussa River (left branch), *Brass* 8631 (type), January, 1937, common about grassy margins of rain-forest (thinly foliated tree of weak branching habit, 7-8 m. high; leaves gray beneath).

The fruit is very tardily, if at all, dehiscent, hence, the species seems to belong to the section HOLOCARPUS. Its most obvious characters are the rounded scarcely oblique base of the leaves, the gray indumentum of the lower surface, and the minutely serrate margin (apparently formed by the very slight projection of the lateral veins); the fruit is obtusish at the apex and the wings are much narrower than in other species which we have examined.

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## RECORDS OF INDO-CHINESE PLANTS

E. D. MERRILL

THE FOLLOWING PAPER is based on selected specimens received from time to time from Dr. A. Pételot of the Université Indochinoise at Hanoi. Several previously described species are herein first credited to Indo-China, while seven are described as new. The genera *Toricellia* de Candolle and *Bennettiodendron* Merrill (*Bennettia* Miquel) are new to Indo-China, while the first true representative of the genus *Sarcosperma* Hooker f. for Indo-China is herein recorded.

## HIPPOCASTANEACEAE

***Aesculus assamica*** Griff. Notul. 4: 540. 1854; Kurz, For. Fl. Brit. Burma 1: 286. 1877; Craib, Fl. Siam. Enum. 1: 338. 1926.

*Aesculus punduana* Wall. List, no. 1189. 1829, *nomen nudum*; Hiern, in Hook. f. Fl. Brit. Ind. 1: 675. 1875.

*Aesculus khasyana* Voigt, Hort. Suburb. Calc. 97. 1845, *nomen nudum*.

INDO-CHINA, Tonkin, Langson Province, near Dong Mo, *Pételot* 6315, February, 1938. Sikkim, Assam, Burma, Siam, and Yunnan.

Not previously recorded from Indo-China, the only species of the genus admitted by Lecomte, Fl. Gén. Indo-Chine 1: 1005. 1912, being *Aesculus chinensis* Bunge. As the latter species is one of northern China (Chihli, Shansi, Shensi, Honan, Chekiang, Kiangsu) it is suspected that Lecomte's Indo-Chinese record was based on an erroneously identified specimen. Possibly a glabrescent form of *Aesculus Wilsonii* Rehd. is represented by the Balansa specimen that Lecomte examined.

## SABIACEAE

***Meliosma caudata*** sp. nov. § *Simplices*.

Species *M. squamulatae* Hance affinis, differt foliis glabris, haud lepidotulis, nervis lateralibus magis numerosis, floribus pedicellatis, in ramulis ultimis racemose haud glomeratim dispositis. Frutex vel arbor parva, ramis teretibus, glabris, plus minusve lenticellatis, ultimis circiter 2 mm. diametro; foliis simplicibus, firme chartaceis vel subcoriaceis, oblongo-ob lanceolatis, longe caudato-acuminatis, acuminibus gracilibus, obtusis, 1.5–2.5 cm. longis, basi acutis, margine integris vel in partibus superioribus dentes conspicuos 1 vel 2 utrinque gerentibus, 7–12 cm. longis, 2–3.5



cm. latis, utrinque glabris, supra olivaceis, opacis, subtus pallide brunneis; nervis primariis utrinque 9–12, curvato-adscendentibus, arcuato-anastomosantibus, supra subobscuris, subtus elevatis, perspicuis, reticulis primariis distinctis, sublaxis; petiolo gracili, 2.5–5 cm. longo; inflorescentiis terminalibus vel in axillis superioribus, paniculatis, pedunculatis, folia aequantibus vel paullo excedentibus, adpresse pubescentibus, pedunculo 4–7 cm. longo; ramis primariis 2–4 cm. longis; floribus numerosis, racemose dispositis, haud glomeratis, omnibus pedicellatis, pedicellis dense adpresse pubescentibus, 1–3 mm. longis; bracteolis late ovatis, pubescentibus, circiter 1 mm. longis; sepalis late rotundato-ovatis, obtusis, 1.5 mm. longis; petalis majoribus orbiculari-ovatis, concavis, 2.5 mm. longis; ovario ovoideo, glabro, stylis ovarium aequantibus.

INDO-CHINA, Tonkin, near Chapa, *A. Pételot* 6342, April, 1938, altitude about 1600 m.

While I have compared this with *Meliosma squamulata* Hance, from which it differs notably in its rather open panicles, the racemosely arranged flowers being distinctly pedicelled, not in glomerules, as well as in its different vegetative characters, its true alliance may be with three very closely allied species of India and southwestern China, *M. pungens* Wall., *M. yunnanensis* Franch., and *M. Fischeriana* Rehd. & Wils. from all of which it differs by its very slender, greatly elongated petioles. Normally there are from three to five erect panicles from the tips or from near the tips of each ultimate branchlet. The leaves may be entire, or with one or two conspicuous sharp teeth on each side in the upper one-half.

#### THEACEAE

##### *Camellia indochinensis* sp. nov. § *Theopsis*.

Arbor parva, glaberrima, ramis ramulisque teretibus, ramulis ultimis circiter 1 mm. diametro, internodiis plerumque 1–2.5 cm. longis; foliis chartaceis, ellipticis, 5–11 cm. longis, 2–5 cm. latis, laevibus, supra viridibus vel viridi-olivaceis, subtus pallidioribus, breviter obtuse acuminatis, basi acutis vel leviter acuminatis, margine breviter serrato-dentatis vel serrato-crenulatis, dentibus brevissimis, plerumque brevissime apiculato-glandulosis, 2–3 mm. distantibus; nervis primariis utrinque 6–7, subtus elevatis, distincte laxe arcuato-anastomosantibus, reticulis primariis laxis; petiolo circiter 5 mm. longo; floribus axillaribus terminalibusque, solitariis, albidis, breviter (ca. 1 mm.) pedicellatis, 1.5–2 cm. diametro; bracteolis glabris, circiter 1.5 mm. longis; sepalis utrinque glabris, concavis, coriaceis, exterioribus subovatis, circiter 3 mm. longis, interioribus ellipticis, tenuioribus, ad 8 mm. longis; petalis membranaceis, ellip-

ticis, rotundatis, glabris, circiter 1.5 cm. longis, deorsum connatis; staminibus numerosis, circiter 1 cm. longis, filamentis glabris, deorsum connatis, basi petalis adnatis; ovario glabro; stylis 3, gracilibus, ad basim liberis, circiter 1.2 cm. longis.

INDO-CHINA, Tonkin, Langson Province, near Van Linh, *Pételot 6459*, November 17, 1938, on calcareous rocks or ledges.

A species characterized by being entirely glabrous in all parts, by its relatively thin leaves, and especially by its three, slender, entirely free styles. It is perhaps most closely allied to *Camellia rosaeiflora* Hook. of China.

***Camellia cordatula* sp. nov.**

Frutex vel arbor parva, glabra, ramis ramulisque teretibus, ramulis laevibus, ultimis 1.5–2 mm. diametro, internodiis 2–8 cm. longis; foliis brevissime petiolatis, firme chartaceis vel subcoriaceis, late oblongis vel oblongo-ellipticis, 10–15 cm. longis, 4–7 cm. latis, supra olivaceis, subnitidis, subtus paullo pallidioribus, utrinque minutissime verrucosis, basi rotundatis, distincte cordatis, semiamplexicaulibus, apice distincte obtuseque acuminatis, margine minute subdistanter subcrenato-denticulatis, dentibus 2–6 mm. distantibus; nervis primariis utrinque 8–10, subtus elevatis, curvatis, arcuato-anastomosantibus, reticulis obsoletis vel subobsoletis; petiolo 2–3 mm. longo; floribus axillaribus vel terminalibus, solitariis, saltem 3 cm. diametro, breviter (3–4 mm.) pedicellatis; sepalis numerosis, extus minute puberulis, intus glabris, subcoriaceis, omnibus rotundatis, exterioribus reniformibus, 3–4 mm. longis, 6–7 mm. latis, interioribus gradatim majoribus, ultimis subellipticis, 2–2.5 cm. longis, circiter 1.5 cm. latis; petalis staminibusque ignotis; ovario ovoideo, dense pubescente, stylis 5, ad basim liberis, cinereo-pubescentibus, circiter 1.5 cm. longis; bracteolis late ovatis, subimbri-catis, 2–3 mm. longis, rotundatis, interdum breviter apiculatis.

INDO-CHINA, Tonkin, Hoa Binh Province, between Hoa Binh and Vu Ban, *A. Pételot 6387*, May 5, 1938.

A species apparently belonging in the group with *Thea flava* Pitard, characterized by its shortly petioled, distinctly cordate and semiamplexicaul leaves and its five free styles, the styles and ovary densely pubescent.

CORNACEAE

***Toricellia angulata* Oliver var. *intermedia* (Harms) Hu, Jour. Arnold Arb. 13: 336. 1932, Ic. Pl. Sin. 5: 37. t. 237. 1937.**

*Toricellia intermedia* Harms ex Diels, Bot. Jahrb. 29: 507. 1901, Wang. Pflanzenr. 41(IV.129): 33. 1910.

INDO-CHINA, Tonkin, Chapa, *Pételot 6363*, April, 1938, alt. 1500 m. Yunnan, Szechuan, Hunan, Kwangsi, the species in Szechuan and Hupeh.

This is the first representative of the genus to be reported from Indo-China, although Gagnepain, suspecting that it might occur there, included it in his key to the genera (Lecomte, *Fl. Gén. Indo-Chine* 2: 1184. 1923). This Tonkin form seems clearly to be the same as *T. intermedia* Harms, which Hu, with apparently valid reasons, has placed as a variety of *T. angulata* Oliver. When Wangerin monographed the group in 1910, he had seen no specimens representing Oliver's species, recognizing three species, *T. tiliaefolia* DC., *T. angulata* Oliver, and *T. intermedia* Harms.

#### MYRSINACEAE

***Maesa acuminatissima*** Merr. Philip. Jour. Sci. 23: 257. 1923.

*Maesa striata* Mez, var. *opaca* Pitard in Lecomte, *Fl. Gén. Indo-Chine* 3: 784. f. 88, 4. 1930.

Whether this be considered merely as a variety of *Maesa striata* Mez (type from Sumatra), or as a distinct species, *M. striata* Mez var. *opaca* Pitard is clearly the same as the earlier *M. acuminatissima* Merr. (type from Hainan). Pitard gave a very ample description of his variety, based on collections from several localities in Tonkin, including Mount Bavi. It is now represented by several Hainan collections, and I have examined one recent one from Mount Bavi, *Pételot 6311*, Feb. 24, 1938. Indo-China, Hainan, and Kwangsi (*Tsang 24715*).

#### PRIMULACEAE

***Primula cordata*** sp. nov. § *Carolinella*.

Planta astolonifera, foliis omnibus basalibus, elliptico-ovatis vel late ovatis, chartaceis, late rotundatis, basi distincte cordatis, auriculis latissime rotundatis, haud lobatis, margine leviter denticulatis crenato-denticulatis vel integris, in sicco leviter rugosis, supra olivaceis, glabris, subtus pallidioribus, secus costam nervosque obscure pubescentibus, 4.5–6 cm. longis, 3.5–5.5 cm. latis, nervis primariis utrinque circiter 5, subtus elevatis, arcuato-anastomosantibus, reticulis supra subelevatis, distinctis, subtus gracilioribus; petiolo gracili, 2–5 cm. longo, sulcato, haud alato, consperse obscure pubescente; scapo gracili, sulcato, leviter consperse pubescente, circiter 10 cm. longo; bracteis anguste lanceolatis, acuminatis, 2–4.5 mm. longis, obscure pubescentibus; floribus 6–8, umbellato-racemosis, parvis, pedicellis 5–7 mm. longis; calycis tubo circiter 1.6 mm. longo, lobis lanceolatis, acuminatis, 1 mm. longis, haud

acrescentibus; corollae tubo 7 mm. longo, cylindrico, sursum leviter ampliato, lobis patulis, obcordatis, 3.5–4 mm. longis; filamentis brevissimis, antheris 1–1.2 mm. longis; ovario glabro; stylis 7 mm. longis; capsulis ignotis.

INDO-CHINA, Tonkin, Chapa, *A. Pételot* 6448, April, 1938, on clayey, humid, talus slopes, route to Lo Qui Ho, alt. 1800 m.

*Primula cordata* Merr. seems clearly to be allied to *P. Partschiana* Pax (*Carolinella cordifolia* Hemsl.) which was based on *Henry* 10890 from Yunnan, but has very much smaller leaves which are not at all setaceous-dentate, shorter petioles and almost umbellate, rather than racemose inflorescences (the pedicels so crowded that the inflorescence looks almost like a true umbel), while the flowers are distinctly smaller than are those of Pax's species. The vegetative characters of the present species render it necessary to recast Pax and Knuth's key, as by the characters given by them *Primula cordata* Merr. falls in the section *BULLATAE* Pax where it manifestly does not belong.

This is the third species of *Primula* to be recorded from Indo-China, Gagnepain, in 1930, recognizing only *P. chapaensis* Gagnep. The second species is *Primula Petelotii* W. W. Sm. Notes Bot. Gard. Edinb. 16: 288. 1931, based on *Pételot* 3717 from Chapa; all three known species occur in one general locality.

***Lysimachia chapaensis* sp. nov.** § *Eulysimachia*, *Apodanthera* (*Alternifoliae*).

Herba glaberrima, epunctata, haud aromatica, simplex vel pauciramosa, caulibus deorsum prostratis, radicanibus, 15–60 cm. longis, sursum erectis, 2–2.5 mm. diametro, sulcatis vel subteretibus, haud alatis; foliis omnibus alternis, membranaceis, olivaceo-viridibus, haud punctatis, oblongo-ovatis vel ovato-ellipticis, perspicue acuminatis, basi acutis, nervis primariis utrinque 4–5, gracilibus, subadscendentibus; petiolo gracili, haud alato, 1–2.5 cm. longo; inflorescentiis terminalibus vel subterminalibus, depauperato-racemosis, paucifloris, rhachibus 1–1.5 cm. longis, flores 2–3 longe pedicellatos gerentibus, pedicellis gracilibus, 4–5 cm. longis, bracteolis lanceolatis, acuminatis, 3–4.5 mm. longis; floribus ut videtur flavidis, plerumque 5-meris, circiter 3 cm. diametro; sepalis 5 (raro 6 vel 7), oblongo-ovatis vel ovato-lanceolatis, acuminatis, graciliter 5-nervis, haud punctatis, circiter 4 mm. longis, 1.5–2 mm. latis, deorsum leviter connatis; petalis 5, oblongo-ellipticis, rotundatis, circiter 1.4 cm. longis, 6 mm. latis, subliberis; staminibus 5, filamentis crassissimis, vix 2 mm. longis, deorsum leviter connatis, quam antheris multo brevioribus; antheris oblongis, obtusis, 3.5–5 mm. longis, basi sagittatis,



lateraliter dehiscentibus; ovario ovoideo, glabro; stylis 6 mm. longis.

INDO-CHINA, Tonkin, Chapa, A. Pételot 6347, April, 1938, altitude about 1800 m.

This species has been placed in accordance with Handel-Mazzetti's revision of the Chinese species, Notes Bot. Gard. Edinb. 16: 51-122. 1928, and is the fifteenth species of the genus to be reported from Indo-China. Its general alliance is with *Lysimachia ramosa* Wall. It is well characterized by its usually elongated terete or subterete stems which are prostrate and often rooting below, and its usually 3-flowered, terminal or subterminal racemes, each pedicel being subtended by a small leaf-like bracteole. Like Wallich's species the anthers open by lateral slits, not by terminal pores as do many of the other species in this group. In one flower dissected seven sepals were found, but this flower was otherwise 5-merous.

#### SARCOSPERMATACEAE

**Sarcosperma kachinense** (King & Pantl.) Exell, Jour. Bot. 69: 100. 1931; Lam. & Varos. Blumea 3: 188. 1938, *cum syn.*

INDO-CHINA, Tonkin, Langson Province, Thanh Moi, Pételot 6281, February, 1938. Burma, Siam, southeastern Tibet, Yunnan, Kwangsi, Kwangtung, and Hainan.

This is apparently the first true *Sarcosperma* to be recorded from Indo-China, as *S. tonkinense* H. Lecomte, Bull. Mus. Hist. Nat. Paris 24: 534. 1918, Fl. Gén. Indo-Chine 3: 914. 1930, is excluded from the genus by Lam and Varossieau in their recent monographic treatment of the group, Blumea 3: 198. 1938. They conclude that *Sarcosperma tonkinense* H. Lecomte probably does not belong in the Sarcospermataceae. The species was originally described as *Combretum kachinense* King & Pantling in 1900, and again, independently, as *Sarcosperma kachinense* Cowan in October, 1931, who overlooked Exell's transfer of *Combretum kachinense* King & Pantl. to *Sarcosperma* in April, 1931.

#### OLEACEAE

**Linociera brachythyrsa** sp. nov.

Arbor parva, 5-6 m. alta, glabra, inflorescentiis leviter pubescentibus exceptis; ramis ramulisque pallidis, teretibus, ultimis circiter 1 mm. diametro; foliis oppositis, ellipticis, firme chartaceis vel subcoriaceis, in sicco pallidis, opacis vel leviter nitidis, subabrupte obtuse acuminatis, basi acutis vel subobtusis, 6-9 cm. longis, 2-4 cm. latis, nervis primariis utrinque 6-9, patulis, supra obscuris, subtus elevatis, perspicuis, arcuato-

anastomosantibus, reticulis laxis, haud perspicuis; petiolo 1–2 mm. longo; inflorescentiis axillaribus terminalibusque, 1–2 cm. longis, distincte pedunculatis vel e basi ramosis, leviter pubescentibus; bracteis bracteolisque 2–2.5 mm. longis, subspathaceis vel obovatis, extus leviter pubescentibus; floribus perfectis, circiter 7 mm. longis, subconfertis, breviter (1.5–2 mm.) pedicellatis; sepalis ovatis, acutis vel obtusis, leviter pubescentibus, circiter 1.5 mm. longis; petalis liberis, anguste oblongis, circiter 7 mm. longis et 1 mm. latis, sursum vix angustatis, obtusis, haud acuminatis; antheris ellipsoideis, 1 mm. longis; ovario ovoideo, glabro.

INDO-CHINA, Tonkin, Langson Province, near Van Linh, *A. Pételot* 6293, February, 1938, near small streams, flowers reddish.

A species well characterized by its pale, prominently nerved, relatively small leaves and especially by its flowers being somewhat crowded in unusually short inflorescences, as well as by the sparse indumentum on the inflorescences. By Gagnepain's arrangement of the nine hitherto known species of Indo-China, it falls in the group with *L. macrophylla* Wall. and *L. Harmandii* Gagnep., but is not closely allied to either of these.

#### FLACOURTIACEAE

##### ***Bennettiodendron cordatum* sp. nov.**

Arbor parva, 5–6 m. alta, ramis teretibus, laevibus, glabris, ramulis circiter 1.5 mm. diametro, dense pubescentibus; foliis firme chartaceis, oblongo-ellipticis, 8–16 cm. longis, 4–7 cm. latis, distincte acuminatis, deorsum paullo angustatis, subabrupte rotundatis, distincte cordatis, margine serratis, dentibus subobtusis, 4–9 mm. distantibus, supra olivaceis, praeter costam nervosque leviter pubescentia glabris, subtus subconcoloribus, ad costam nervosque distincte pubescentibus, reticulis primariis laxis elevatis puberulis; nervis lateralibus utrinque circiter 10, subtus elevatis, valde perspicuis, arcuato-anastomosantibus; petiolo 8–18 mm. longo, dense pubescente; inflorescentiis racemoso-paniculatis plerumque terminalibus, solitariis, puberulis, 5–7 cm. longis, ramis primariis brevibus, 1–3 mm. longis, plerumque 2–3-floris; pedicellis puberulis, 2–3 mm. longis; floribus ♂ 3-meris, sepalis suborbiculari-ovatis, rotundatis, concavis, submembranaceis, 3–3.5 mm. longis, tenuiter 3–4-venosis, extus glabris, margine plus minusve ciliatis; staminibus numerosis, filamentis 3 mm. longis, pilosis; glandulis anguste ovoideis, glabris, 0.5 mm. longis.

INDO-CHINA, Tonkin, Sontoy Province, Mount Bavi, *A. Pételot* 6308, February 24, 1938, in open forests, altitude about 400 m.

A species, in this small group, whether considered under *Bennettiodendron* Merrill (1927), or as *Bennettia* Miquel (1859), (non *Bennettia* S. F. Gray 1821, nec R. Brown, 1852), strongly characterized by its distinctly cordate leaves and by its indumentum. The first representative of the genus to be recorded from Indo-China.

#### SYMPLOCACEAE

**Symplocos congesta** Benth. Fl. Hongk. 211. 1861; Brand, Pflanzenr. 6(IV.242): 69. 1901.

INDO-CHINA, Tonkin, Chapa, *Pételot* 6369, April, 1938, altitude about 1500 m. Hongkong, Kwangtung, Kwangsi, Kiangsi.

Bentham's species was based on a Hongkong specimen collected by Champion, with the citation of a *Fortune* specimen. He describes the leaves as "entire or rarely bordered with small glandular teeth" and Brand merely says "folia . . . denticulata." The Champion specimen in the Kew herbarium has entire leaves, but I have not seen the Fortune material; all our Kwangtung, Kwangsi, and Kiangsi material has entire leaves. It is suspected that *Symplocos cuspidata* Brand, Pflanzenr. 6(IV.242): 69. 1901, which was based on a North River specimen from Kwangtung, will not prove to be distinct.

#### VERBENACEAE

**Premna Chevalieri** Dop. Bull. Soc. Bot. France 70: 445. 1923, et in Lecomte Fl. Gén. Indo-Chine 4: 813. f. 87, 6. 1935.

*Premna acuminatissima* Merr. Univ. Calif. Publ. Bot. 10: 430. 1924, non Merr. Lingnan Sci. Jour. 6: 884. 1930.

Dr. Dop's species was based on Tonkin collections made by Chevalier and by Bon, while mine, published a year later, was based on *Pételot* 1434; the two are manifestly identical. The true alliance of this species is with the Chinese *Premna puberula* Pamp., and some forms very closely approximate the latter.

In 1930 I inadvertently published a second species, from Hainan, under the same binomial I had used for the Indo-Chinese species six years earlier, and in his synonymy Dr. Dop (Fl. Gén. Indo-Chine) has confused this with the earlier one. His citations to the Lingnan Science Journal and P'ei's treatment of the Chinese Verbenaceae should be eliminated and the one to the University of California publication added. The Hainan species is very different from the Indo-Chinese one, and the following nomenclatural adjustment is made for it:

**Premna octonervia** Merrill & Metcalf nom. nov.

*Premna acuminatissima* Merr. Lingnan Sci. Jour. 6: 884. 1930; P'ei, Mem. Sci. Soc. China 1(3): 73. t. 15. 1932 (Verb. China), non Merr. Univ. Calif. Publ. Bot. 10: 430. 1924.

This species with corymbose inflorescences rather than paniculate ones, is not closely related to *Premna Chevalieri* Dop, and at present is known only from Hainan. It is represented by the following specimens: *Lau* 362, 1579, 1655, 5143, 6234, 26732, 26843, *How* 70841, *Fung* 20387, *Tsang* 15660, and *Wang* 34111, 35000.

**Premna fulva** Craib, Kew Bull. 1911: 442. 1911; Dop in Lecomte Fl. Gén. Indo-Chine 4: 809. 1935.

*Premna crassa* Hand.-Maz. Anz. Akad. Wiss. Wien 58: 231. 1921; Symb. Sin. 7: 904, 1936; P'ei, Mem. Sci. Soc. China 1(3): 76. 1932 (Verb. China).

*Premna Fortunati* Dop, Bull. Soc. Bot. France 70: 444. 1923.

INDO-CHINA, Tonkin, Langson Province, between Dang Mo and Van Linh, *Pételot* 6374, April 3, 1938; Ninh Binh Province, Cho Ganh, *Pételot* 890, April, 1923. Siam, Yunnan, Kweichow, Kwangsi.

*Pételot's* specimens are in flower, while the type collection of *Premna crassa* Hand.-Maz., is in fruit, yet as far as the material is directly comparable I can detect no tangible differences. Handel-Mazzetti has suggested the reduction of *Premna Fortunati* Dop to *P. crassa* Hand.-Maz., and from the published descriptions, a fragment of Dop's type, and an isotype of *Premna crassa* Hand.-Maz., I can see no reasons for distinguishing the two. At my request Mlle. Ast compared the material in the Paris Herbarium with the available specimens representing *Premna fulva* Craib, and states that, in view of the intermediate characters of some of the specimens, in her opinion the two should be united without even a varietal distinction. *S. P. Ko* 55136 from Tai Chin Shan, Kwangsi, represents the same species.

## SCROPHULARIACEAE

**Paulownia Fortunei** (Champ.) Hemsl. Jour. Linn. Soc. Bot. 26: 180. 1890.

*Campsis Fortunei* Seem. Jour. Bot. 5: 373. 1867.

*Paulownia Mikado* T. Ito, Ic. Pl. Jap. 1: t. 9-12. 1912.

INDO-CHINA, Tonkin, Chapa, *Pételot* 4182, February, 1931, altitude 1500 m., a tree 8-10 m. high, corolla violaceous, the flowers appearing before the leaves; Langson Province, between Dong Mo and Van Linh, *Pételot* 6323, March 24, 1936, in open forests. Chekiang, Anhwei,



Fukien, Kwangtung, Kweichow, Kwangsi, Honan, Yunnan, and Formosa.

*Paulownia meridionalis* Dode was described from imperfect specimens (flowers unknown but said to be white) from Laos, while I have previously credited *P. Fargesii* Franch. to Tonkin. The specimens above cited, with numerous mature flowers, seem to represent typical *Paulownia Fortunei* (Seem.) Hemsl. from which *P. Mikado* T. Ito does not appear to be distinct.

ARNOLD ARBORETUM,

HARVARD UNIVERSITY.

ON CERTAIN MALAYSIAN SPECIES OF MELIOSMA BLUME<sup>1</sup>

E. D. MERRILL AND L. M. PERRY

IN STUDYING the assembled *Meliosma* material (excluding the Chinese collections) in the herbarium of the Arnold Arboretum we note some significant extensions of range, and include also the description of three hitherto apparently undescribed species. These data are embodied in the present paper.

***Meliosma Bartlettii* nom. nov.**

*Meliosma trichocarpa* Merr. Pap. Michigan Acad. Sci. 24(1): 80. 1938 (1939), non Handel-Mazzetti, 1934.

A new name is needed for this Sumatran species, which was based on a series of specimens secured by Professor H. H. Bartlett's native collector Rahmat. Handel-Mazzetti used the name for a Chinese species in 1934; hence, this necessary change.

***Meliosma pedicellata*** Koord. & Val. Meded. Lands Plant. 61: 134. 1903 (Bijdr. Boomsoort. Java 9: 134), Atlas Baumart. Java 2: f. 379. 1914.

BRITISH NORTH BORNEO: Mount Kinabalu, Upper Kinataki River, *Clemens* 31993, February 22, 1933, at about 2100 m. alt.; Penataran River, *Clemens* 33631, June 21, 1933, at about 2700 m. alt.; Colombon River, *Clemens* 33710, June 27, 1933, at about 1700 m. alt.

These collections differ from the original description and plate of *Meliosma pedicellata* Koord. & Val. only in the somewhat larger leaves (9–18 cm. long, 3.5–8 cm. broad).

***Meliosma ferruginea*** Blume, Cat. Gew. Buitenz. 32. 1823; Nees, Bot. Zeit. 8(1): 106. 1825; Blume, Rumphia 3: 200. 1847; Miq. Fl. Ind. Bat. 1(2): 616. 1859, Fl. Arch. Ind. 74. 1871; Koord. & Val. Meded. Lands Plant. 61: 121. 1903 (Bijdr. Boomsoort. Java 9: 121), Atlas Baumart. Java 2: f. 375. 1914.

*Millingtonia ferruginea* Schult. Syst. Veg. Mant. 1, Add. 2: 250. 1827.

NORTHEASTERN NEW GUINEA: Morobe District, *Clemens* 2168, March 26, 1936, at about 600 m. alt.; Wareo, *Clemens* 1578, January 10, 1936, at about 600 m. alt.

<sup>1</sup>Botanical Results of the Richard Archbold Expeditions.

These specimens show only leaves, buds and immature fruit. Although with flowering material for comparison, they may prove to represent a new species, they compare most favorably with the Bornean and Javan specimens of *Meliosma ferruginea* Blume as to the indumentum, and the size and outline of the leaflets.

**Meliosma sumatrana** (Jack) Walpers, *Annales* 1: 135. 1848; Miquel, *Fl. Ind. Bat.* 1(2): 617. 1859; Hooker f. *Fl. Brit. Ind.* 2: 6. 1876.

*Millingtonia sumatrana* Jack, *Malay. Miscel.* 2(7): 30. 1822.

*Meliosma Diepenhorstii* Val.  *Ic. Bog.* 2: t. 150. 1904.

BRITISH NORTH BORNEO: Mount Kinabalu, Penibukan, *Clemens* 30321, 30516, 31699 = 31844, 40738, 50187.

With some hesitation we assign these collections to this species. All specimens except the last show fruit; in no. 50187 the inflorescence has not reached anthesis. The fruits compare favorably with specimens of this species from Sumatra; usually, however, the base of the petiolule is more enlarged in the Bornean material. Although we have no authentic material for comparison, on account of the differences in the shape and the size of the inner petals of the two species we have omitted *Meliosma nitida* Blume from the synonymy of this one. In this, *M. sumatrana* (Jack) Walp., the inner petals are distinctly acute and project above the filaments. In *M. nitida* Blume they are described as shorter than the filaments and repand-crenulate at the apex.

**Meliosma philippinensis** sp. nov.

*Meliosma sumatrana* sensu Merr. *Enum. Philip. Fl. Pl.* 2: 518. 1923, non Walp.

Ramuli teretes, glabri; foliis impari-pinnatis, alternis, glabris, vel in rachi, costa nervisque parce puberulis, plerumque 3-4-jugis; rachi 15-23 cm. longa; petiolulis  $\pm$  1 cm. longis; foliolis suboppositis, lanceolato-oblongis ad ellipticis, acuminatis, basi in petiolum angustatis, integris vel parce dentatis, chartaceo-coriaceis, reticulatis, subtus venis prominentibus; inflorescentiis circiter 30 cm. longis, rachi ramulisque pubescentibus; floribus glabris; sepalis late rotundis; petalis exterioribus obovato-orbicularibus, circiter 1.5 mm. longis, 2 mm. latis, interioribus vix 1.5 mm. longis, filamentis paullum brevioribus, cuneatis, apice retusis vel erosis; ovario glaberrimo, disco 5-denticulato cincto; drupis subglobosis vel obovoideis, basi laterali gibberosis; putamine oblique globoso,  $\pm$  1 cm. longo, vix 1 cm. lato, osseo, dorso costato.

PHILIPPINE ISLANDS: Mindanao, Surigao, *Wenzel* 2534 (type), 2945, 3331, *Mallonga* (*For. Bur.* 27000); Zamboanga District, *Ramos* &

*Edaño* (*Bur. Sci.* 37368); Lanao District, *Alvarez* (*For. Bur.* 25173); Bukidnon Subprovince, *Edaño* (*Bur. Sci.* 39054, 39101); Mount Apo, *Clemens* (*Bur. Sci.* 15599), *Elmer* 10531, 11178, 13297, 13771.

This species, previously included in *Meliosma sumatrana* (Jack) Walp., differs from the latter in having shorter, truncate or erose, inner petals and considerably smaller fruits (scarcely half as large as in the Sumatran material). *Meliosma philippinensis* is more like *M. nitida* Blume, of which we have neither flowers nor fruit for comparison. The description of the latter, however, indicates ellipsoid fruits twice as large as in the Philippine form.

***Meliosma humilis* sp. nov.**

Arbor parva; ramulis subteretibus ad apicem  $\pm$  dense ferrugineo-hirsutis; foliis impari-pinnatis, alternis, vulgo 4–5-jugis; rachi 20–30 cm. longa, initio hirsuta, demum glabrata; petiolulis  $\pm$  1 cm. longis,  $\pm$  hirsutis; foliolis chartaceo-coriaceis, suboppositis, patentibus, in specimine typica  $\pm$  9 cm. longis, circiter 3.5 cm. latis, in ceteris usque ad 15 cm. longis, 6 cm. latis, oblongis ad ellipticis, apice acutis vel breviter acuminatis, basi subrotundatis vel superiorum acutis vel cuneatis, margine plerumque acute dentatis, reticulatis, costa venisque primariis initio hirsutis, demum glabratis, venis primariis utrinque 8–12, subtus prominentibus; inflorescentiis  $\pm$  25 cm. longis, divaricate ramosis, hirsutulis, multifloris; floribus subsessilibus vel breviter pedicellatis, glabris; sepalis ciliolatis, subrotundis; petalis exterioribus late obovato-orbicularibus, circiter 1 mm. longis, 1.5 mm. latis, interioribus infra medium dorso filamentorum adnatis, utrimque in appendiculum brevem productis; staminodiis connatis; disco subannulari quam ovario paullo brevior, 5-lobato, lobis subulatis.

BRITISH NEW GUINEA: Central Division, Mount Tafa, *Brass* 5050 (type), May–September, 1933, in the valley-forest, at about 2400 m. alt. (small substage tree; leaves clustered at the ends of the branches; peduncle and pedicels reddish brown; flowers small, white and numerous). NORTHEASTERN NEW GUINEA: Morobe District, without definite locality, *Clemens* 6262, January, 1937, at 2400–3200 m. alt.; Ogeramang, *Clemens* 4465, 4828, December 2, 1936 and January 1, 1937, at  $\pm$  2400 m. alt.; Goliteng Camp, Sarawaket Bush, *Clemens* 5288, February 1, 1937, at 2800–3200 m. alt.

This species suggests *Meliosma nervosa* Koord. & Val. in the dentation and outline of the leaflets as shown in Koord. & Val. Atlas Baumart. Java 2: f. 376. 1914. It is not so glabrate a species and differs also in the subulate lobes of the disk and the shorter lobes of the inner petals (attached



near the base of the filaments). In the angles between the midrib and the primary veins of the leaf is often a dense tuft of hairs.

**Meliosma sarawakensis** Ridley, Kew Bull. 1933: 193. 1933.

*Meliosma grandifolia* Lecomte, Bull. Soc. Bot. Fr. 54: 676. 1907, non Urban (1895).

BORNEO: Sarawak, without definite locality, *Native collector* 106, 139, 2696.

Tentatively we assign these collections to this species. They are also close to *M. latifolia* Ridley. Unfortunately, we have no authentic specimens at hand for comparison, and the descriptions alone are not sufficiently precise to make clear the differences between these two species unless we accept Ridley's character "stamina 2, hirsuta" for *M. latifolia*. In the various Malaysian species we have scanned in an effort to locate our unnamed material we have not found any hirsute stamens, the tips of the appendages of the filaments may have a few very minute hairs, but in several of the species the ovary is somewhat hirsute or tomentose.

**Meliosma confertiflora** sp. nov.

Ramuli teretes, fusco-cinerei, novelli tomentoso-hirsuti; foliis imparipinnatis, alternis, plerumque 3-4-jugis; rachi 18-22 cm. longa, initio tomentoso-hirsuta demum glabrata; petiolulis 5 mm. longis; foliolis suboppositis vel inferioribus alternis, 8-15 cm. longis, 3-4.5 cm. latis, lanceolatis, acuminatis, basi inaequaliter obtusis, margine integris vel sparse subulato-dentatis, subtus reticulatis, costa venisque primariis undique  $\pm$  pubescentibus; venis primariis utrimque  $\pm$  10, subtus conspicuis; inflorescentiis ramosis, (in specimine typica) 9 cm. longis, 4.5 cm. latis, multifloris, rachi ramisque tomentoso-hirsutulis; floribus confertis, subsessilibus; sepalis ciliolatis, subrotundis; petalis exterioribus late rotundis vel obovatis, interioribus infra medium dorso filamentorum adnatis, utrimque in appendiculum brevem productis vel bi- tri-lobis; ovario parce pubescente.

BRITISH NORTH BORNEO: Mount Kinabalu, Dallas, *Clemens* 26961 (type), 26961bis, November 6 and 2, 1931, at about 900 m. alt.

This species, although closely approaching *Meliosma sambucina* (Jungh.) Miq. (= *M. glauca* Blume) in general habit, may be distinguished by the shorter petiolules, and the short and compact inflorescences. Although both specimens are in bud only, it does not seem as if the inflorescence could possibly grow to the size of that of *M. sambucina* (Jungh.) Miq.

**Meliosma rufo-pilosa** Henderson, Gard. Bull. Straits Settl. 7: 96, *t.* 18. 1933.

BRITISH NORTH BORNEO: Mount Kinabalu, Tenompok, *Clemens* 28823, 28823 *bis*, 29909, March 14 and June 13, 1932, at about 1500 m alt.

These collections are a good match for an isotype of *Meliosma rufo-pilosa* Henderson. This rather distinct species has been previously reported only from Pahang.

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## STUDIES IN THEACEAE. IV NEW AND NOTEWORTHY SPECIES OF EURYA

CLARENCE E. KOBUSKI

SINCE THE PUBLICATION of the synopsis of "Eurya, Subgenera Euryodes and Penteurya" in 1937,<sup>1</sup> several new species have come to the attention of the author making a supplementary paper necessary. Besides the new species, other noteworthy recently described species and nomenclatorial notes are included. All specimens cited in this study are to be found in the herbarium of the Arnold Arboretum of Harvard University unless otherwise designated. These borrowed specimens are cited under the abbreviations NY = Herbarium of the New York Botanical Garden, New York, and SY = Herbarium of the Botanical Institute, Sun Yatsen University, Canton, China.

### *Eurya alata*, spec. nov.

Frutex glaberrimus 2 m. altus, ramulis alatis, alis ad 1 mm. latis; foliis glaberrimis coriaceis lineari-lanceolatis 6-8 cm. longis et 1.5-2.5 cm. latis, apice obtusis retusisque, basi cuneatis, supra viridibus, subtus luteo-viridibus, margine serrulatis, petiolis 2-3 mm. longis; floribus femineis axillaribus 2-3 aggregatim dispositis, pedicellis 2 mm. longis glabris, sepalis 5 imbricatis subrotundatis apice obtusis emarginatis, basi plus minusve contractis, petalis 5 albidis basi plus minusve connatis oblongo-obovatis 2-2.5 mm. longis et 0.5-1.0 mm. latis, ovario glabro conico-globoso, stylo brevi  $\pm$  1 mm. longo 3-fido, ovario ignoto.

KWANGTUNG: Pan-Ling Tsze, Pei-Koong, North River, in dense woods, *W. Y. Chun* 5924, Dec. 25, 1927 (shrub 2 m. with white flowers).

An interesting feature of this species is the outstanding winged condition on the very young branchlets with wings as much as 1 mm. long making the branchlets appear almost quadrangular. In the older branchlets, the wings are reduced to pronounced ridges which seem to zigzag along the stem. *Eurya alata* because of the texture, veining and symmetry of its leaves, resembles *E. glaberrima* Hayata from Formosa. However, it can be separated from the latter by its winged stem, longer style and delicate corolla. In *E. glaberrima*, according to Hayata, the

<sup>1</sup>Kobuski in *Ann. Missouri Bot. Garden*, 25: 299-359. 1937.

style, being only 0.25 mm. long, is one of the shortest in the genus. In *E. alata* the style measures  $\pm 1$  mm. in the flower.

**Eurya Brassii**, spec. nov.

Frutex prostratus vel adscendens (ex collectore), ramulis pubescentibus; foliis dense dispositis distichis glabris coriaceis obovatis vel ovatis 1–2 cm. longis et 0.7–1.2 cm. latis, apice obtusis retusis, basi cuneatis, margine serrulatis revolutis, venis supra profunde impressis reticulatis, petiolis 1–1.5 mm. longis; floribus pistillatis axillaribus singularibus vel binis, pedicellis ca. 1.5 mm. longis, bracteis sepaloideis, sepalis 5 inaequalibus ca. 2 mm. longis et 1.5 mm. latis, margine glandulosis, petalis 5 albidis breve connatis, obtusis 3 mm. longis et 1.0–1.5 mm. latis, ovario ovato ca. 2 mm. longo et 1.25 mm. lato, stylo ca. 0.5 mm. longo tripartito, floribus masculis axillaribus singularibus vel binis, pedicellis ca. 1 mm. longis, bracteis sepaloideis, sepalis 5 inaequalibus 2–3 mm. longis et 1–2 mm. latis, margine glandulosis, petalis 5 albidis breviter connatis obovatis, 3–4 mm. longis et 3 mm. latis, staminibus 8–13, filamentis 2 mm. breviter connatis, antheris 1 mm., ovario rudimentario; fructu maturo ignoto.

PAPUA: Central Division, Wharton Range, Murray Pass, grassland ridge crests, alt. 2840 m., *L. J. Brass* 4185 ♀ (TYPE), June–Sept. 1933 (common prostrate or ascending shrub often rooting from branches; corolla white; fruit dark blue).—Central Division, Mt. Albert Edward, in low thickets on summits of low ridges on grasslands, alt. 3680 m., *L. J. Brass* 4499 ♂ May–July 1933 (common, low, dense-foliaged shrub with white flowers).

*Eurya albiflora* White is one of the closest relatives of *E. Brassii*. Both species have small (1–2 cm. long) distichous coriaceous leaves with nerves deeply impressed on the upper surface. However, White's species is a shrub or small tree up to 6 m., while *E. Brassii*, according to the collector, is a prostrate or ascending shrub with a tendency to root from the branches. Also in *E. albiflora* the branchlets and underside of the leaves are densely pubescent with long brown hairs while in *E. Brassii* the branchlets except for the very young growth are quite glabrous and the leaves are always glabrous.

Another relative is *E. Hellwigii* Lauterbach. In Lauterbach's species, the leaves are usually 3 cm. or over in length and about 2 cm. wide and have up to nine pair of veins. The habit is that of a tree (3–5 m.). In *E. Brassii* the leaves are not only distinctly smaller but there are hardly ever more than five or six pair of veins.



**Eurya brevistyla**, spec. nov.

Ramuli glabri subalati brunnei vel griseo-brunnei; foliis coriaceis glabris obovatis vel ellipticis 4.0–6.5 cm. longis et 1.8–2.5 cm. latis, apice acuminatis, basi cuneatis, margine serrulatis, petiolo 3.5 mm. longo, glabro; floribus ignotis; fructibus axillaribus globosis vel subglobosis glabris ca. 5 mm. longis et 4–5 mm. latis, pedicello ca. 1.5 mm. longo glabro, bracteis 3 inaequalibus glabris sepaloideis minute apiculatis, sepalis 5 inaequalibus concavis glabris ca. 2.0 mm. longis orbicularibus vel suborbicularibus, margine papyraceis, stylo tripartito brevissimo ca. 0.25 mm. longo.

SZETCHUAN: Ma-pien Hsien, *F. T. Wang* 23083, May 29, 1931.

The very short style (0.25 mm.) is a most unusual character for this genus, especially in China. It is sufficient to separate the species from all other glabrous Chinese species. The spreading stigmas are longer than the style. There were no flowers on the specimen. *Eurya brevistyla* can be separated from *E. nitida* its nearest Chinese relative by the short style, the obovate leaves and the short pedicels of the fruit.

**Eurya cavinervis** Vesque in Bull. Soc. Bot. France, **42**: 158. 1895.

*Eurya Handeliana* Kobuski in Ann. Missouri Bot. Gard. **25**: 309. 1937.

*Eurya aurescens* sensu Handel-Mazzetti, Symb. Sin. **7**: 400. 1931, quoad descript. excl. syn.; non *Eurya japonica* Thunberg var. *aurescens* Rehder & Wilson.

INDIA: Sikkim, *J. D. Hooker* in 1859 (TYPE in Mus. d'Hist. Nat. Paris, fragment & photo. AA).—Burma, between Sadon and the Yunnan-Chinese border at Changtifang and Kambaiti, alt. 2750 m., *J. F. Rock* 7046, Nov. 1922 (shrub 5–8 ft. in moss forest).—in thickets, Fort Hertz, Hkamti Plain, alt. 360 m., *F. Kingdon Ward* 9060, Dec. 23, 1930 (bushy evergreen with white flowers).

CHINA. Yunnan: exact locality lacking, *G. Forrest* 15692 (HOLOTYPE of *E. Handeliana*).—*G. Forrest* 8922, 8940, 11944, 17519, 21537.—*H. Handel-Mazzetti* 8724.—*C. Schneider* 2488, 2793.—*J. F. Rock* 3157, 8066.—*C. Wang* 63268, 67060, 67441, 67497, 72041, 72044, 72413.

*Eurya cavinervis* has remained in obscurity since its publication by Vesque in 1895. Recently, a leaf specimen of the type (*Hooker*, Sikkim, collected in 1895) was obtained from the Herb. Mus. Paris and it proves to be identical with the species described by me in 1937 as *E. Handeliana*. The deeply impressed veins on the dorsal surface of the shining coriaceous leaves, together with the leaf size are outstanding features of the species not to be mistaken for any other species of *Eurya*.

**Eurya cavinervis** Vesque var. **strigillosa** (Handel-Mazzetti), comb. nov.

*Eurya nitida* Korthals var. *strigillosa* Handel-Mazzetti, Symb. Sin. 7: 400. 1931.

YUNNAN: in dense mixed forest near the town Hsiangschuiho, between Dali [Talifu] and Lidjiang [Likiang], alt. 2750 m., *H. Handel-Mazzetti* 6453 (ISO-HOLOTYPIC of *E. nitida* var. *strigillosa*, SY).—*C. Wang* 63677, 66749. SZECHUAN: in forest, Mt. Omei, alt. 2400 m., *T. T. Yü* 480, April 21, 1932 (shrub 5 ft. with white flowers and leaves dark green above).—*Science Institute of West China* 3793 in 1932.

Shining coriaceous dark-green leaves with deeply impressed or channeled veins on the upper surface and raised on the under surface are the characters which ally this variety to *E. cavinervis* rather than *E. nitida* as Handel-Mazzetti had thought. The pubescent character of stem and flower-parts, together with the terete stem, are features which separate it from its species, *E. cavinervis*.

**Eurya chuekiangensis** Hu in Bull. Fan Mem. Inst. Biol., Bot. Ser. 8: 147. 1938.

NORTHWESTERN YUNNAN: in forest, Bar-Ru-La, Salween-Chue-Kiang Divide, alt. 3000 m., *C. Wang* 67407 ISOTYPIC, Oct. 1935 (bushy shrub, 5 ft. high with greenish black fruit).

This species is glabrous throughout even to the terminal buds. Unusual features are the very short style (0.25–0.75 mm.) and the conico-rostrate fruit. The latter character is found only occasionally in this genus. Most species are characterized by distinctly globose fruit. As in most perfectly glabrous species, the young branchlets are winged, however, only slightly so in this species.

**Eurya dasyclados**, spec. nov.

Frutex 1 m. minusve altus, ramulis crassis, teretibus ferrugineo-pilosis; foliis coriaceis rigidis oblongo-ovatis 7–10 cm. longis et 2.5–3.5 cm. latis, basi subrotundatis subcordatis vel cuneatis, apice obtuse acuminatis, supra flavo-viridibus, venis utrinque elevatis, reticulatis, costa subtus pilosis, margine glanduloso-serrulatis revolutis, petiolis crassis parvis 3 mm. minusve longis dense pilosis; floribus pistillatis 3–4 axillaribus subsessilibus vel pedicellis 1 mm. longis, bracteis sepaloideis inaequalibus pilosis, sepalis 5 imbricatis inaequalibus concavis obtusis ca. 1.5 mm. longis sparse pilosis, petalis 5 ca. 2 mm. longis acuminatis, basi adnatis, 0.75 mm. latis, apice 0.25 mm. latis, ovario 2 mm. longo, globoso, glabro, stylo tripartito, 1 mm. longo, ad basim libero; floribus masculis ignotis; fructibus subglobosis, glabris, 4 mm. longis, nigrescentibus.

KWANGSI: Tong Shan (along Kwangtung border), near Sap-luk Po village, Waitsap District, *W. T. Tsang* 22790, TYPE, Sept. 15, 1933 (fairly common; dry sandy soil, silt; scattered shrubs 2 ft. high; fruit dark blue). KWANGTUNG: Sam Kok Shan, Tsungfa-Lungmoon Districts, *W. T. Tsang* 20431, May 11, 1932 (roadside, dry place; shrub 1 m. tall with black fruit).—Sam Kok Shan, Cheung Uk Village, Ts'ung-hwa (Tsung-fa) District, *W. T. Tsang* 24846, Mar. 1–16, 1935 (abundant; thicket, three feet high; fruit black).—Chaochow District, *N. K. Chun* 42631, April 5–May 1, 1931 (shrub in woods).

This species is characterized by thick sturdy terete branches covered with a dense ferruginous pilose pubescence for the first year's growth and dense patchy black pilose pubescence for the second and third year's growth. Its nearest relative, the recently described *E. rugosa* Hu has the same pubescence for the initial year's growth, after which it becomes glabrescent. Also, the branchlets appear terete for the first year in *E. rugosa*, but in the second year appear, as Hu puts it, somewhat winged.

The leaves are coriaceous, rigid, oblong-ovate, 7–10 cm. long and 2.5–3.5 cm. wide and are yellowish or metallic green in color. The venation presents a most interesting character. At first glance, it appears that the veins are impressed on the upper surface. This is caused by successive depressions in the leaves (at least, in the dried state) at each primary lateral vein. However, on close observation one finds that the veins, even to the secondary and cross-veins, are distinctly raised on both surfaces. In *E. rugosa* the veins are deeply impressed, like channels on both surfaces.

The same pilose pubescence of the very young growth is sparse on the lower surface, especially along the midrib. In the type specimen (fruiting) the calyx, especially along the central line, the bracts and pedicels are covered with dense ferruginous hairs. This is less noticeable in the flowering specimen from Kwangtung.

The corolla-lobes are very narrow in comparison with those of other species of *Eurya* and taper from 0.75 mm. at the base where they are adnate for 1 mm. to 0.25 mm. near the acuminate apex.

The ovary and fruit are both glabrous. In *E. rugosa* the ovary is not known. However, in Hu's species the fruit resembles that of *E. trichocarpa* Korthals in being glabrescent and in both species only the presence of occasional hairs show that the fruit was once pubescent. When a flowering pistillate specimen is eventually collected, the ovary probably will be covered with a dense hoary pubescence like that of *E. trichocarpa* in flowering condition.

*Eurya dasyclados*, to date, is confined to Kwangsi (along the Kwang-

tung border) and Kwangtung, while *E. rugosa* Hu is found in Szechuan.

***Eurya Huiana*, spec. nov.**

Arbor vel frutex, 2-7 m., ramulis pubescentibus teretibus rubro-brunneis; foliis coriaceis glabris raro costis puberulentis ellipticis vel oblongo-ellipticis vel oblongo-obovatis 6-8.5 cm. longis et 2.5-3 cm. latis, basi cuneatis, apice acuminatis, supra nitide viridibus, subtus pallide viridibus, margine glanduloso-serrulatis, venis subobscuris, petiolis ca. 5 mm. longis glabris; floribus femineis masculisque ignotis; fructibus nigrescentibus globosis glabris ca. 5 mm. diam. pedicellis ca. 2 mm. longis glabris bracteis 2 sepaloideis glabris, sepalis 5 imbricatis inaequalibus glabris 2 mm. longis et 1.5 mm. latis subrotundatis, stylo ca. 2 mm. longo tripartito ad 1 mm. supra basim.

KWEICHOW: on slope in forest, Miao Wang, Kiangkou Hsien, alt. 600 m., *A. N. Steward, C. Y. Chiao & H. C. Cheo 569*, TYPE AA, ISOTYPE NY, September 27, 1931 (shrub 2 m. with black fruit).— In open, Hei-shui-chee, Shih tsien san District, *Y. Tsiang 4173*, in 1930 (small tree 1 m.; leaves green above, pale green beneath).— In densely shaded mixed woods, Wai-ho, Kweiting, alt. 600 m., *Y. Tsiang 5604, 5609*, July 6, 1930 (shrub, 3 m.; leaves lustrous green above, light green below; fruit green) (AA, NY, SY).— In light woods, foot of Vanchingshan, Kiangkow, alt. 450 m., *Y. Tsiang 7491, 7498*, Dec. 8, 1930 (small tree 4 m.; leaves coriaceous, deep lustrous green above, light green below; fruit black) (AA, NY).— In densely shaded ravine, Vanchingshan, Yinkiang, alt. 400-500 m., *Y. Tsiang 7728*, Dec. 19, 1930 (tree 8 m. with leaves deep lustrous green above, light green below; fruit black).— In dense woods, Vanchingshan, Yinkiang, alt. 600 m., *Y. Tsiang 7824* Dec. 25, 1930 (small tree 7 m.; leaves deep sublustrous green above, light green below; fruit black) (AA, NY).

HUNAN: shady slope, Ma-Ling-Tung, Sinning Hsien, alt. 650 m., *C. S. Fan & Y. Y. Li 585*, Oct. 9, 1935 (shrub 3 m.; fruit becoming black when ripe).

Most workers of this genus have identified this species with *E. nitida* Korthals. In general appearance there is a great resemblance between the two species. However, *E. Huiana* has pubescent leaf buds, young branchlets and occasionally puberulent midribs, which immediately separate it from the strictly glabrous *E. nitida*. The stems of this newly described species are terete in contrast to the winged stems of *E. nitida*.

Some of the *Tsiang* specimens, especially 5604, 5609, 7491 and 7498 have leaves larger than those described from the type. These specimens have leaves 7-10.5 cm. long and 2.5-4.8 cm. wide. On the other hand,



*Tsiang* 4173, 7824, 7728 and *Fan & Li* 585 have leaves corresponding in size to those of the description.

Unfortunately all the specimens cited are fruiting specimens, so that it is impossible to give a description of the flowers at this time.

It is a pleasure to name this distinct species in honor of Professor Hsen Hsu Hu, the Chinese botanist who not only has contributed much to the knowledge of Chinese Theaceae but has also been an inspiration to many students of botany in China.

***Eurya impressinervis*, spec. nov.**

Frutex vel arbor parva glabra, ramulis prominenter alatis glabris; foliis membranaceis glabris ovatis (vel obovatis) 7–11 cm. longis et 2–3 cm. latis, basi cuneatis, apice acuminatis margine serrulatis, nervis supra impressis, subtus acute elevatis, petiolo 2–5 cm. longo glabro; floribus masculis in axillis foliorum solitariis vel binis ut videtur, pedicellis glabris 2.0–2.5 mm. longis, bracteis sepaloideis, sepalis 5 imbricatis inaequalibus suborbicularibus concavis apiculatis margine glandulosis, petalis 5 basi paulo adnatis obovatis 5 mm. longis et 1.5–2.5 mm. latis, staminibus 15, filamentis ca. 2 mm. longis, antheris lobatis 2 mm. longis, ovario rudimentario; floribus femineis 2–4 in axillis foliorum, pedicellis glabris ca. 2.5 mm. longis, bracteis sepaloideis, sepalis 5 imbricatis inaequalibus 1.25 mm. longis, apice obtusis glanduloso-apiculatis, petalis 5 basi paulo connatis, linearibus, apice obtusis retusis ca. 3.25 mm. longis et ca. 1 mm. latis; ovario ovato 1.5 mm. longo et 0.75 mm. lato, stylo 1.75 mm. longo tripartito, stigmatibus 3; fructibus immaturis globosis ca. 3 mm. longis latisque, pedicellis 3 mm. longis.

KWANGSI: exact locality and date lacking, *C. Wang* 40569 TYPE, 40504, 83567, 39482.— Virgin forest, Lao Shan, Loh Hoh Tsuen, Lin Yui Hsien, alt. 1800 m., *A. N. Steward & H. C. Cheo* 418, May 16, 1933 (shrub 5 m. high) (AA, NY).— In forest, Chu Feng Shan, 30 li s.w. of Shan Fang, N. Luchen, alt. 725 m., *R. C. Ching* 5827 (rare tree 6 m. high; light shining green leaves with impressed nerves above) (NY, SY).— Locality lacking, *R. C. Ching* 5981, June 14, 1928 (SY).

The outstanding characters of this species are the membranaceous leaves and the depressed venation on the upper leaf surface. The veins on the lower surface are sharply raised and light in color. Depressed venation, even to a greater degree, is found in other species such as *E. cavinervis* and *E. Metcalfiana*. However, in both these latter species, the leaves are very coriaceous. The winged condition of the branchlets in *E. impressinervis* is more pronounced than is usually found in the genus.

This species, so far as is known, is confined to Kwangsi. Unfortunately, the field notes for the C. Wang - Kwangsi collection, which includes the type, are not available at present, but the data concerning the exact locality, date of collection and miscellaneous notes pertaining to the specimens will be completed as soon as the notes arrive.

**Eurya lanciformis**, spec. nov.

Arbor 10 m. (ex collectore), ramulis alatis cinereis glabris, innovationibus leviter pubescentibus; foliis coriaceis glabris lanceolatis vel oblongo-ovatis, supra nitido-viridibus subtus pallido-viridibus, apice acuminatis, basi cuneatis, margine undulatis, 7-10 cm. longis et 1.3-2.5 cm. latis, venis undique elevatis, petiolo 3-5 mm. longo glabro; floribus ignotis; fructibus globosis purpureis 4-5 mm. longis, pedicello 3-4 mm. longo glabro, bracteis parvis 2 sepaloideis, sepalis 5 glabris inaequalibus suborbicularibus ca. 1.5-2 mm. longis et 1.5 cm. latis, margine glandulosis, stylo tripartito ca. 2 mm. longo.

KWANGSI: in woods, Seh-fing, Dar Shan, S. Nanning, alt. 750 m., *R. C. Ching 8106* (NY, TYPE; SY), Oct. 21, 1928 (tree 30 ft. with gray bark; leaves thick, glossy green above, light green below; fruit oblong-ovate, dark purple).

The type of this species was identified formerly as *E. nitida*. There is a resemblance to this species. However, *E. lanciformis* resembles more closely *E. japonica* in that the leaves are slender-elongate and the leaf-margin is undulate-serrate rather than sharply serrate as in most species of the genus. The lower third of the leaf-margin is nearly entire.

The unfolding leaf-buds are sparsely pubescent on the very young petioles. This is the only pubescence on the whole plant and this in turn becomes glabrescent before the leaves are mature. This pubescence would not be observed unless one should be looking for just this feature. Otherwise, it is a typical glabrous species with winged branchlets.

**Eurya Metcalfiana**, spec. nov.

Frutex humilis, ramulis glabris; foliis persistentibus coriaceis glabris ellipticis vel oblongo-ellipticis, 2.0-3.5 cm. longis et 8-15 mm. latis, basi cuneatis, apice breviter obtuse acuminatis, margine serrulatis, nervis utrinque 7-10, supra profunde impressis, subtus leviter elevatis, brevissime petiolatis, petiolis ca. 1 mm. longis; floribus masculis in axillis foliorum solitariis (ex specimine) fragrantibus, pedicellis glabris 1-2 mm. longis, bracteis 2 sepaloideis, sepalis 5 imbricatis glabris concavis obtusis inaequalibus ca. 3 mm. longis et 2.5 mm. latis, petalis 5 basi connatis albidis obtusis ca. 5 mm. longis et 2-3 mm. latis, staminibus 10, fila-

mentis 3 mm. longis, antheris basi lobatis 1.5 cm. longis, ovario rudimentario, floribus femineis ignotis; fructo immaturo globoso, stylo 0.25 mm. longo.

KWANGTUNG: in thicket, Lo Hai Ngan Sam Kok Shan, Cheung Uk Village, Ts'ung-hwa (Tsung-fa) District, *W. T. Tsang* 24842 TYPE (woody 2 ft. high; flowers white, fragrant). ANHWEI: open rocky ridge, Whang Shan, S. Anhwei, alt. 1400 m., *R. C. Ching* 2992, July 13, 1925 (common low dense shrub with gray bark; leaves glossy green above, pale below) (AA, SY).—Yellow Mt., alt. 1800 m., *M. Chen* 1243, 1262, 1319 (SY).

Because of its deeply impressed nerves on the upper surface of the leaf this species resembles somewhat *E. Fangii* Rehder and *E. cavinervis* Vesque. However, *E. Fangii* is characterized by pubescence on the young leaves and branchlets, a more sharply acuminate leaf with sharper serrations. In *E. Metcalfiana* the leaf buds and young growth in general are strictly glabrous. *Eurya cavinervis*, although also strictly glabrous, is a much more robust species with larger leaves and is confined to India and Yunnan, while *E. Fangii* as far as known, is found only in Szechuan.

This species is named in honor of Prof. Franklin P. Metcalf of Lingnan University. Professor Metcalf has been associated with Chinese botany for over a decade and has contributed much to our knowledge of the flora of Fukien and Kwangtung.

***Eurya obovata*** (Blume) Korthals in Temminck, Verh. Nat. Gesch. Bot.

3: 118. 1840.—For further citations and synonymy see Kobuski in Ann. Missouri Bot. Gard. 25: 343. 1937.

Distribution: Celebes, Java (fide Korthals), Sumatra, Borneo.

BORNEO. Mt. Kinabalu: Upper Kinabalu, *J. & M. S. Clemens* 27833, 28990, 29881, 30347, 50813, 50879.

***Eurya obovata*** (Blume) Korthals var. **platyphylla**, var. nov.

A specie typica differt foliis majoribus 5–9 cm. longis et 3.5–4 cm. latis vel foliis 3.5–5.5 cm. longis et 2–3.5 cm. latis in speciminibus ad var typicam accedentibus.

BRITISH NORTH BORNEO. Mount Kinabalu: Hill thicket, Marai Parai, alt. 1500 m., *J. & M. S. Clemens* 32344 (TYPE), March 22–24, 1933.—Also *J. & M. S. Clemens* 30862, 32413, 35094, 40871, 40883, 50009, 50298, at 1200–1800 m. alt.; 29800, 33108, 33946, 50621, 50986, 50989, 55093 at 2400–2750 m. alt.

On examining material collected by J. & M. S. Clemens on Mt. Kina-

balu, British North Borneo, one is bewildered by the fact that the field numbers and dates of collection lack correlation. Higher numbers have often been given to material collected at an earlier date than the low number. Also, accurate altitude records have not been recorded on all labels. This last may be due to copying the label, since on the only original field label seen, the altitude has been recorded.

For this species and its variety, nearly twenty-five specimens were obtained from Mt. Kinabalu, and if there was a reasonable correlation between date, number and altitude, one might be able to show with confidence a fine series of gradation from the small-leaved *E. obovata* to the large-leaved variety *E. obovata* var. *platyphylla*. As it is, the series must be filled in with material labeled merely "alt. 6000-13500 ft."

Even so, the species itself is found to occur at an altitude of about 3300 m. and is characterized by small coriaceous leaves, 1.5-3 cm. long, 1-1.5-2 cm. wide with the veins deeply impressed on the upper surface and raised on the lower surface. At the other extreme and at an altitude of 1200-1800 m. is found the large-leaved variety here described. This is characterized by leaves 5-9 cm. long and 3.5-4 cm. wide with veins distinctly raised on both surfaces.

Examining only the diverse material mentioned above, one would not hesitate separating the two as widely distinct species. However, at an altitude of 2400-2750 m. is found an intermediate stage with leaves 3.5-5 cm. long and 2-3.5 cm. wide. Some leaves have impressed veins on the upper surface while others have raised veins such as are found on the large-leaved specimens, and still others have raised veins with impressed channels. Examples of the diverse venation can be found on a single branchlet.

Rather than designate two varieties, one for the large-leaved and one for the intermediate stage, I am including both under the single variety described above.

***Eurya pahangensis*, spec. nov.**

Frutex [vel arbor ?], ramulis cinereo-brunneis teretibus pubescentibus asperatis; foliis subcoriaceis oblongo-ovatis 5-7.5 cm. longis et 1.5-2.5 cm. latis pubescentibus, supra nitidis, basi cuneatis, apice acuminatis, margine serrulatis, venis utrinque elevatis, petiolis ca. 2 mm. longis pubescentibus; floribus femineis axillaribus 2-3, pedicellis ca. 2 mm. longis pubescentibus, bracteis 2 pubescentibus sepaloideis, sepalis 5 imbricatis inaequalibus suborbicularibus ca. 1.5 mm. longis, petalis 5 ca. 2.5 mm. longis et 1.5 mm. latis, apice obtusis, basi connatis, ovario subgloboso dense cano-pubescente, stylo ad medium 4- vel 5- fido; fructibus ignotis.



FEDERATED MALAY STATES: Pahang, Fraser's Hill, *E. J. H. Corner* (Singapore Field Number 33241), August 19, 1937.

This species is characterized by a dense hoary pubescence on the ovary, 4-5-fid style and rough, pubescent, terete, gray branchlets. *Eurya trichocarpa*, its nearest relative, has a sparse pubescence confined almost solely to the terminal bud, 3-fid style and smooth, shining, almost glabrous reddish branchlets.

***Eurya paratetragonoclada*** Hu in Bull. Fan Mem. Inst. Biol., Bot. Ser. 8: 149. 1938.

SOUTHWESTERN YUNNAN: in forest, Che-tse-lo, alt. 3200 m., *H. T. Tsai* 58438, ISOTYPE, Sept. 8, 1937 (tree 4 m. with blue fruit).

In his description of this species, Hu refers repeatedly to the pubescence. In the genus *Eurya*, the terminal bud is rather a good criterion of the general glabrous or pubescent condition of the whole plant. In this species, the isotype shows the terminal bud to be strictly glabrous and I fail to find any pubescence on either surface of the leaves. The mere fact that the young branchlets are angled would lead one to infer that the plant would be glabrous since these two characteristics usually go together. Hu also refers to the sepals and fruit as "with scattered hairs." Unfortunately, my isotype is sterile so that I can merely conjecture that these also might be glabrous.

In the English description the internodes are said to be "7 to 1.5 mm. long." This should read 7 to 15 mm. long.

***Eurya pentastyla***, spec. nov.

Frutex [vel arbor ?], ramulis rubro-brunneis, innovationibus pubescentibus, alatis pubescentibus secundum alas axillasque ceterum glabris; foliis coriaceis glabris oblongo-ovatis 6.5-8.5 cm. longis et 1.5-2.3 cm. latis, basi cuneatis, apice acuminatis, venis obscuris utrinque elevatis, margine subundulato-serratis minutissime glandulosis, petiolis ca. 2 mm. longis; floribus ignotis; fructibus axillaribus 3 glabris globosis ca. 4-5 mm. longis, pedicellis glabris 3 mm. longis, bracteis 2 distinctis sepaloideis, sepalis 5 imbricatis glabris subrotundatis inaequalibus 1.5-2 mm. longis et ca. 1.5 mm. latis, stylo ad trientem inferiorem 5-partito, 3 mm. longo.

SUMATRA: vicinity of Tomoean Dolok, Asahan, alt. 1000 m., *Rahmat Si Boeea* 9027, TYPE, June 10-15, 1936.— Same locality, *Rahmat Si Boeea* 9076, June 10-15, 1936.— The summit, Tor Matoetoeng, Asahan, alt. 1792 m., *Rahmat Si Boeea* 9417, July 10-15, 1936.

This Sumatran species is characterized by 5-parted styles, pubescent

leaf-buds and winged stems with a fine pubescence in the angle of the wings, and glabrous fruit, in so far as one can be sure from an examination of a mature fruiting specimen.

Unusual is the combination of pubescent leaf-buds and winged stems, as is the pubescence in the angles of the wings. Generally one associates winged stems in *Eurya* with strict glabryity.

The nearest relative is Malayan-Chinese *E. trichocarpa* Korthals. This latter species has a 3-parted style, pubescent leaf-buds with terete stems and pubescent ovary which in fruit becomes glabrescent. This glabrescent condition may be found to apply to *E. pentastyla* when flowering specimens can be examined.

***Eurya pittosporifolia*** Hu in Bull. Fan Mem. Inst. Biol., Bot. Ser. 8: 150. 1938.

SOUTHWESTERN YUNNAN: in dense forest, Che-li-Hsien, Dah-Meng-Lung, Meng-Soong, alt. 2000 m., *C. W. Wang* 78362 (ISOTYPE AA), Sept. 1936 (common tree 6 m.).

The pubescent ovary and 5-parted styles are excellent distinguishing features of the species. The styles are 3 mm. long and distinct rather than connate. Other significant diagnostic characters are the puberulent terminal buds covered with dense white pubescence and the glabrous, long-acuminate leaves.

***Eurya quinquelocularis***, spec. nov.

Arbor 3–10 m., ramulis cinereo-brunneis teretibus pubescentibus; foliis membranaceis oblongo-ovatis 7–15 cm. longis et 2–4 cm. latis, subtus leviter pubescentibus, basi cuneatis, apice acuminatis, venis supra impressis, subtus elevatis, margine serrulatis, petiolis 2–3 mm. longis; floribus femineis 5–6 axillaribus, pedicellis pubescentibus 6 mm. longis, bracteis 2 ca. 1 mm. longis pubescentibus sepaloideis, sepalis 5 imbricatis pubescentibus inaequalibus concavis, 2–2.5 mm. longis et ca. 2 mm. latis orbicularibus, petalis 5 orbicularibus 3 mm. longis 1.5 mm. latis basi connatis 1 mm., ovario globoso glabro 5-loculari, stylo 3–3.5 mm. longo, 5-partito, basi connato 1 mm.; floribus masculis ignotis; fructibus globosis quinquelocularibus 6 mm. latis nigrescentibus.

KWANGSI: in woods, Chu Feng Sha, 30 li southwest of Shan Fang, N. Luchen, alt. 600 m., *R. C. Ching* 5794 (TYPE AA; ISOTYPE NY, SY), June 7, 1928 (tree 30 ft. [diameter 1 ft.] with gray bark; leaves lustrous green above, pale below; fruit green turning to black).—Shap Man T'ai Shan, Nam She Village, southeast of Shang-sze, Kwangtung Border (Shang-sze District), *W. T. Tsang* 24560, 24753, Oct. 22 - Nov. 26,

1934.—Precise locality and date of collection lacking, *C. Wang* 39002, 39941.—Midway up mountain side, Pingnan, Lo Huo'ng, Iu Shan, *Kwangsi Museum* 200, Jan. 13, 1924 (shrub 5–6 ft. with brown bark) (SY).—Hillside in woods, at foot of mountain, Pingnan, *Kwangsi Museum* 760, Dec. 25, 1923 (shrub 5–6 ft. with brown bark) (SY). YUNNAN: in forest, Mengtse, alt. 1525 m., *A. Henry* 10372 (tree 10 ft. with yellowish flowers) (AA, SY).

This species is characterized by a 5-celled fruit and 5-parted style, membranaceous leaves with impressed veins on the upper and raised veins on the lower surface. Long pedicels (6 mm.) cause the flowers and fruit to stand out from the stem.

This species should not be confused with *E. pentastyla* Kobuski of Sumatra. The only relationship of note is the 5-styled condition of flower and fruit. The nearest relative is perhaps *E. cerasifolia* (D. Don) Kobuski from which it can easily be separated by the 5-styled flowers and fruit mentioned above.

***Eurya rugosa*** Hu in Bull. Fan Mem. Inst. Biol., Bot. Ser. 8: 151. 1938.

WESTERN SZECHUAN: in thickets, Ping-Shan Hsien, alt. 1600 m., *F. T. Wang* 22685, ISOTYPE, April 16, 1931 (shrub).

This species is very distinct and is characterized by thick rugose leaves with impressed venation on both surfaces. The venation character separates it quickly from *E. dasyclados* Kobuski which possesses raised venation on both surfaces. Also in the latter species the fruit is glabrous while *E. rugosa* has fruit which is minutely pilosulose soon becoming glabrescent.

Hu says that the young branchlets are “terete ferruginous-villosulose, striate, more or less winged and glabrescent in age.” This so-called winged condition, although very slight, is unusual on a species as distinctly pubescent as *E. rugosa*. Generally speaking, the species seems to be glabrescent after the first year's growth. In *E. dasyclados* the branchlets are densely pilose on the second and third year's growth.

*Eurya rugosa*, according to Hu, possesses styles which are two-parted and adnate at the base. All the styles examined on the isotype deposited at the Arnold Arboretum are three-parted and split to the base. Occasionally some appear two-parted but a closer examination shows that the third-part has been broken off near the base.

***Eurya subintegra***, spec. nov.

Frutex, ramulis alatis glabris rubro-brunneis; foliis coriaceis glabris, ad 10 cm. longis et 3.5 cm. latis, acuminatis, basi cuneatis, margine

integris vel subintegris raro crenulato-serrulatis, venis undique leviter elevatis, petiolis ca. 1 cm. longis; floribus ignotis; fructibus immaturis ovatis, pedicellis 4–5 cm. longis glabris, bracteis sepaloideis, sepalis 5 glabris inaequalibus ca. 1.5–2 mm. longis et 2.5 mm. latis, stylo ca. 1.5–2 mm. longo tripartito.

KWANGSI: Taai Ip Wong Ming Shue, Shap Man Taai Shan, near Iu Shan village, s.e. of Shang-sze, Kwangtung Border (Shang-sze District), fairly common in silt and swamp, *W. T. Tsang 22212* TYPE, May 5, 1933, (scattered shrubs, 1 m.; fruit dark blue).— Shap Man Taai Shan, near Iu Shan village, s.e. of Shang-sze, Kwangtung Border (Shang-sze District), abundant in clay soil, *W. T. Tsang 22256*, May 10, 1933 (3.5 m. high; fruit dark blue).

The entire or nearly entire leaves of this species recall to mind *E. Macartneyi* Champion. However, in *E. Macartneyi*, the stems are terete even though the species is strictly glabrous, an unusual combination of characters in the genus. In *E. subintegra* the winged or angled stem accompanies the glabrous condition of the whole specimen.

There are slight differences between the two specimens cited, but these do not appear sufficiently important to separate the two specifically. In *Tsang 22256*, the leaf is larger (13 cm.  $\times$  4 cm.), obovate and tapers to a longer point. Unfortunately, in this specimen the styles are broken off at the point of articulation making it difficult to estimate their length. In *Tsang 22212*, the type, the young branchlets are definitely alate whereas in *Tsang 22256*, the young branchlets are only angled.

HERBARIUM, ARNOLD ARBORETUM,  
HARVARD UNIVERSITY.



STUDIES IN THE BORAGINACEAE, XIII  
NEW OR OTHERWISE NOTEWORTHY SPECIES,  
CHIEFLY FROM WESTERN UNITED STATES

IVAN M. JOHNSTON

***Heliotropium molle* (Torr.), comb. nov.**

*Heliophytum molle* Torr. U. S. & Mex. Bound. Bot. 138 (1859).

*Tournefortia mollis* Gray, Proc. Am. Acad. 10: 50 (1875); not Muell. (1858).

*Tournefortia monclovana* Wats. Proc. Am. Acad. 18: 120 (1883).

TEXAS: plains south of Santiago Peak, 1883, *Havard* 46½ (G).  
COAHUILA: mountains 24 mi. north of Monclova, Sept. 1880, *Palmer* 887 (TYPE of *T. monclovana*, G); Movano, July 1910, *Purpus* 4555 (G); 19 mi. south of Laguna del Rey, a colony on silty floor of a broad valley, with *H. Greggii*, fl. white, leaves thickish, gray, crisped, Sept. 20, 1938, *Johnston* 7803 (G).

The type of *H. molle* was collected by Bigelow near Presidio del Norte (i.e. near Ojinaga), northern Chihuahua. The collection made by Palmer (no. 887) north of Monclova, Coahuila, the type of *T. monclovana*, is unquestionably conspecific. During my travels in Coahuila and Chihuahua, last year, I observed this species at only three localities. In each, it formed large though restricted colonies on dry silty valley-floors or dry sandy stream-ways. The plant spreads underground by rhizomes. The herbaceous stems, 2–3 dm. tall, were numerous at each station but may have come from the rhizomes of a relatively small number of individual plants. I noted the species (1) south of Laguna del Rey near Mohovano (specimen cited above), (2) near the Coahuila-Chihuahua boundary near Guimbalete, and (3) in northern Chihuahua in the type-region between Mula and Ojinaga. The species has a dry velvety fruit which breaks into two-seeded halves at maturity. The halves of the fruit contain two well-developed fertile cells and no infertile cavities. The plant unquestionably belongs to *Heliotropium* and can not possibly be kept in *Tournefortia*.

***Heliotropium assurgens*, nom. nov.**

*Heliotropium phyllostachyum* var. *erectum* Macbride, Proc. Am. Acad. 51: 542 (1916); not *H. erectum* Lam. (1778).

*Anchusa incana* Sesse & Mociño, Fl. Mex. 33 (1893) and ed. 2, 30 (1894); not Ledeb. (1847), nor *H. incanum* R. & P. (1799).

SONORA: Querocoba, Rio Fuerte, *Gentry* 2247 (G). SINALOA: Culican, Oct. 24, 1904, *Brandeggee* (G, TYPE of var. *erectum*). JALISCO: Jalisco, 1923, *Purpus* 9204 (G). GUERRERO: Rio Balsas, 1910, *Orcutt* 4162 (G); Iguala, 1905, *Pringle* 13681 (G); Real de Guadalupe, 1898, *Langlassé* 351 (G); Coyuca, 1934, *Hinton* 6042 and 6640 (G); Anonas, 1936, *Hinton* 9159 (G); Placeres, *Hinton* 9079 (G); Manchon, 1937, *Hinton* 10513 (G). MICHOACAN: Zitacuaro to Tiamara, 1938, *Hinton* 13089 (G); Buena Vista to Tomatlan, 1938, *Hinton* 12078 (G); Apatzingan, 1938, *Hinton* 12054 and 12061 (G). MORELOS: Yautepec, 1903, *Rose & Painter* 6596 and 8579 (G); Huajintlan, 1929, *Lyonnet* 305 (G); Cuernavaca, *Pringle* 7183 and *Rose* 11054 (G). MEXICO: Vigas, 1932, *Hinton* 1218 (G); Salitre, 1935, *Hinton* 8181 (G). OAXACA: Guichocovi to Lagunas, 1895, *Nelson* 2743 (G). EL SALVADOR: Acajutla, 1923, *Calderón* 1673 (G).

In its more slender, more erect habit, pale abundantly strigose leaves, and smaller flowers, fruit and mature calyces, this attractive annual is very different in appearance from *H. fruticosum* L., of the West Indies, Yucatan and extreme northeastern Mexico. It deserves recognition as a species. The name *H. assurgens* is based upon *H. phyllostachyum* var. *erectum* Macbr. and so upon the collection made at Culican, Sinaloa, by Brandeggee. Through the kindness of Mr. Standley, of the Field Museum, I have been able to study the Boraginaceae in the herbarium made in Mexico by Sesse & Mociño. These botanists collected *H. assurgens* and described it as *Anchusa incana*. The specimens in their herbarium have no geographic data but in their Flora Mexicana *Anchusa incana* is given as from Cuernavaca, Morelos.

**Heliotropium** (§ Orthostachys) **cremnogenum**, sp. nov.

Herba annua erecta 8–18 cm. alta; cauli 0.5–1 mm. crasso solitario infra medium simplici supra medium pauce fertiliterque ramoso sparse strigoso, internodiis saepe 1–2 (raro ad 3.5) cm. longis; foliis conspicuis sparsis alternis vel suboppositis superioribus paullo reductis; lamina ovato-oblonga vel lanceo-ovata submembranacea 2–4 cm. longa 8–17 mm. lata nervosa infra medium latiore, apice acuta, basi obtusa vel acuta in petiolum 3–5 mm. longum graciliter contracta, supra viridi in costa et nervis lateralibus sparse strigosa, subtus pallidiore strigosa, margine plana vel angustissime revoluta; inflorescentia racemiformi ebracteata vel medium versus folio grandi caulinis simili ornata, maturitate 3–10 cm. longa gracili laxiflora, internodiis 1–15 mm. longis; calyce sub anthesi elongato 2.5–3 mm. longo, lobis strictis inaequalibus lanceolatis 2–3 mm. longis, lobo longissimo apicem tubi corollae attingente; calyce

fructifero accrescente, lobis ascendentibus vel divergentibus ad 5 mm. longis; pedicellis 0.5–1 mm. longis; corolla 4 mm. longa inconspicua, lobis ad 1 mm. longis linearibus, sinibus latis obtusis saepe plicatis; tubo corollae imam ad basim et paullo sub apice angustissimo (ca. 0.5 mm. crasso) infra medium crassissimo ca. 0.8 mm. crasso, extus sparse strigoso, intus glaberrimo et ca. 0.3 mm. supra basim minute appendiculato; antheris ca. 0.5 mm. longis subsessilibus lanceo-ovoideis ad 1 mm. supra basim tubo corollae affixis, apicem versus attenuatis, supra medium puberulentis, apice non-cohaerentibus; ovario ca. 0.3 mm. alto glabro hemisphaerico vel subovoideo, stylo ca. 0.3 mm. longo coronato; stigmatibus elongato ca. 0.6 mm. longo (disco stigmatibus quam basi appendiculatae sterilis paullo crassiore), sub maturitate fructus ut videtur sessilis; fructu 2.5–3 mm. lato ca. 1.2 mm. alto subquadrilobato; nuculis 4, dorso valde convexus reticulato-rugosis, pilis sparsis erectis curvatis ornatis, ventre angulatis utrisque faciebus impressionibus circularibus notatis.

MICHOACAN: on cliffs at Mal Paso, dist. Huetamo, Oct. 2, 1935, *Hinton 8514* (TYPE, Gray Herb.).

An extraordinarily distinct species differing widely in gross habit and technical fruiting and floral characters from all of its congeners known to me. In general aspect it is more suggestive of a small fruiting plant of *Spigelia Humboldtiana* C. & S. than it is of other species of *Heliotropium*. The minute tubular corolla with linear lobes separated by broad obtuse sinus, and its reticulate-rugose nutlets, are certainly unusual if not unique in the genus.

**Heliotropium** (§ *Orthostachys*) **Karwinskyi**, sp. nov.

Frutex 5–10 dm. altus laxe ramosissimus; ramulis gracilibus fragilibus saepe brevibus, internodiis 1–15 mm. longis; foliis numerosis alternis 3–5 cm. longis 1.5–3.5 mm. latis medium versus latioribus, utrinque gradatim attenuatis, basi cuneatis ca. 1 mm. longe petiolatis, supra obscure viridibus medio-sulcatis pilis appressis e basi pustulato erumpentibus plus minusve vestitis, subtus mediocostatis sed enervatis dense pallideque strigosis, margine anguste revolutis; cymulis racemosis gracillimis ramulos terminantibus pluribus (2–4) simplicibus vel dichotomis 1–4 cm. longis laxifloris minute (0.3–1 mm. longe) bracteatis; floribus fructiferis 1–8 mm. longe distantibus; floribus sub anthesi minutis ca. 1.7–2 mm. longis, 0–0.8 mm. longe pedicellatis, lobis calycis triangulari-ovatis subaequalibus haud imbricatis; corolla late cylindrica 1.5–2 mm. longa calycem paulo superante inconspicua, extus supra basim pallide strigosa, intus medium versus puberulenta, lobis perbrevibus rotundis ca.

0.3 mm. longis latioribus quam latis; antheris cuneato-sagittatis ad 0.5 mm. supra basim corollae affixis subsessilibus, apice acutis puberulentis haud cohaerentibus; ovario ovoideo-globoso ca. 0.6 mm. longo sub anthesi glabro; stylo cylindrico ca. 0.3 mm. longo; stigmatibus glabro crassiusculo disciformi quam columna styli subduplo latiore (2-3-plo latiore quam longo) appendicula elongata sterili destituto; fructu 2.5-3 mm. diametro depresso 1-1.4 mm. alto conspicue albo-hispido; nuculis 4 dorso convexis intus angulatis.

**TAMAULIPAS:** Cumbre de Santiaguillo, frutex 2-3 pedalis, in frigidiusculis, Dec. (?), 1842, *Karwinsky 646* (TYPE, Leningrad; frag. Gray Herb.).

This is an unusually distinct species and one for which I can suggest no very close relative. In gross aspect it most suggests *H. uninerve* Urban, but it is certainly not closely related to that Haitian plant. The very small broadly cylindrical corolla with poorly developed broad erect or incurved lobes, the short thick discoid stigma devoid of a well developed sterile appendage, the free narrowly sagittate anthers, the very slender inconspicuously bracted inflorescence, etc., set *H. Karwinskyi* off from all known species. The type was collected about 50 km. southwest of Victoria in western Tamaulipas.

### ***Heliotropium Genovefae*, sp. nov.**

Planta fruticulosa; caulibus pluribus fistulosis laxè sparseque ramosis 3-5 dm. longis 2-3 mm. crassis fuscis subvelutinis (villosulis et plus minusve glanduliferis) internodiis 1-6 cm. longis; foliis conspicuis pilis brevibus erectis e basi bulbosa erumpentibus dense obsitis, in nervis villosulis; lamina folii ovato-lanceolata vel oblongo-lanceolata 5-11 cm. longa 2.5-5 cm. lata, apice acuta, basi obtusa, infra medium latiore deinde in petiolum 1-2 cm. longum gracilem abrupte contracta, subtus pallidiore costa et nervis pinnatis (ca. 6-jugis) evidenter notatis; cymis scorpioideis terminalibus solitariis vel geminatis densifloribus ebracteatis, maturitate 2-6 cm. longis 1-4 cm. longe pedunculatis; calyce sub anthesi 2-2.2 mm. longo sessili basim versus in lobos oblongo-lanceolatos 0.3-0.4 mm. latos apice acutos diviso; corolla purpurascens ad 7 mm. longa extus villosa intus glaberrima, limbo ad 6 mm. diametro, tubo 4-5 mm. longo e parte basali 2 mm. longa et 1 mm. crassa sursum ampliata apicem versus 2 mm. crasso, lobis rotundis 2 mm. longis et 2.5-3 mm. latis; antheris elongatis lineari-oblongis 2 mm. longis apice inconspicue apiculatis glabris haud cohaerentibus ad 2 mm. supra basim tubi corollae affixis; ovario sub anthesi glabro ca. 0.6 mm. crasso et alto; stylo ca. 0.4 mm. longo in stigma breve ca. 0.3 mm. crassum et 0.1-0.2 mm. altum



abrupte expanso: fructu ellipsoideo-ovoideo 3–4 mm. longo 2–2.7 mm. crasso infra medium crassiore velutino plus minusve glandulifero fusco, maturitate in nuculas 2 biloculares biovulatas disrupto, stylo ut videtur sessili coronato.

HAITI: vicinity of Port à L'Ecu, low thickets on coastal plateau east of bay; fl. purplish, March 15–17, 1929, *Emery C. & Genevieve M. Leonard 13851* (TYPE, U. S. Nat. Herb. no. 1,452,440; ISOTYPE, Gray Herb.).

This is apparently a member of the section COCHRANEA and is the first one to be described from the West Indies. In the structure of its nutlets it agrees with *H. molle* (Torr.) Johnst. of the desert plateau of northern Mexico and adjacent Texas and is probably most closely related to that species. Its more slender loosely branched habit, slenderly petiolate, more elongate, non-crisped leaves and smaller corollas quickly distinguish it from the Mexican plant. In habit it suggests the other Mexican member of the section COCHRANEA, *H. macrostachyum* (DC.) Hemsl., but that plant has one or more infertile cavities supplementing the two seminiferous cells present in each nutlet. The species is named in honor of Mrs. Leonard who discovered the plant while collecting with her husband in Haiti.

***Coldenia canescens* DC., var. *pulchella* var. nov.**

Planta a varietate typica differt corolla duplo majore 9–12 mm. longa, limbo 5–8 mm. diametro.

ARIZONA (Yuma County): Kofa Mts., 1700 ft., March 24, 1933, *Shreve 6257* (TYPE, Gray Herb.); Castle Dome, Sept. 17, 1929, *Jones 25015* (G); rocky hillside near Stone Cabin on Dome-Quartzite road (north end of Castle Dome Mts.), March 23, 1933, *Wiggins 6616* (G). CALIFORNIA (Imperial Co.): Mesquite Station (west base of Chocolate Mts.), March 25, 1881, *Parish 755* (G); prostrate in dry stony soil at head of wash to 4-S Ranch, northeast of Ogilby, Chocolate Mts., April 6, 1932, *Munz & Hitchcock 12181* (G); 4-S Pass, Chocolate Mts., a few rods west of pass in rough rocky terrain, a low compact shrub about 4 inches tall, April 16, 1935, *Peirson* (G).

This variety is known only in extreme southwestern Arizona and, across the Colorado River, in adjacent California. This area includes some of the hottest and most arid desert in the United States. The var. *pulchella* not only has the corollas larger than in the typical variety, but has them also more intensely colored. The fruit, which is entirely glabrous, is indistinguishable from that of *C. canescens*.

**Plagiobothrys californicus** Greene, var. **fulvescens** Johnston, Contr. Gray Herb. 68: 74 (1923).

*Plagiobothrys micranthus* Nelson, Am. Jour. Bot. 25: 115 (1938).

ARIZONA: moist creek bank, Prescott, April 28, 1925, *Nelson 10232* (TYPE of *P. micranthus*, Laramie); White House Canyon, below recreation area, Santa Rita Mts., fl. white, about 4500 ft., April 14, 1928, *Graham 3538* (G); Soldiers Canyon trail below Vails Corral, Santa Catalina Mts., fl. white, April 12, 1928, *Graham 3462* (G).

I have had the privilege of examining the type of *P. micranthus* Nels. and find it conspecific with the two above cited collections made by Graham. All three collections are thoroughly typical of *P. californicus* var. *fulvescens*, a form characteristic of the western borders of the Colorado and Mohave deserts and heretofore unreported from Arizona. In gross aspect *P. californicus* var. *fulvescens* is very similar to the relatively common Arizonan *P. Pringlei* Greene. It differs from this latter species in its unstalked, distinct nutlets and in its slightly less elongate calyx. I suspect that *P. californicus* var. *fulvescens* may be more common in Arizona than the few collections at hand seem to indicate. Perhaps collectors, mistaking it for *P. Pringlei*, have failed to collect it.

**Plagiobothrys infectivus**, sp. nov.

Herba annua e radice gracili palari purpureo-tincta oriens; caulibus saltem basim versus purpureo-tinctis erectis vel ascendentibus solitariis vel pluribus 1–3.5 dm. longis ramos ascendentis saepe 1–2 gerentibus cum pilis gracilibus subappressis et pilis rigidioribus erectis villosulo-hispidis; foliis infimis plus minusve congestis sed vix rosulatis sub anthesi sub-deciduis; foliis caulinis oblongis vel oblongo-linearibus sessilibus 4–10 mm. latis 1.5–6 cm. longis, apice obtusis vel subrotundis, basi obtusis vel attenuatis, supra villosis, subtus pallidioribus pilis sparsioribus aliquantum rigidioribus ornatis, margine et costa purpureo-tinctis; inflorescentia conspicue foliaceo-bracteata saepe solitaria elongata saepe 1–2 dm. longa; floribus extra-axillaribus; corolla alba 4–4.5 mm. longa, limbo ca. 2.5 mm. diametro, lobis ovatis ca. 0.8 mm. latis ascendentibus; calyce sub anthesi extus brunneo-hispidulo, intus albido-villoso, fere ad basim lobato, lobis lineari-lanceolatis; calyce fructifero ca. 4 mm. crasso 1–2 mm. longe pedicellato, lobis lanceolatis 4–5 mm. longis suberectis; nuculis 4 late compresseque ovoideis 2.5–3.5 mm. longis nuculis *P. fulvi* similibus.

CALIFORNIA: "San Luis Obispo and Monterey counties," 1899, *Jared 28* (G); Lower Hospital Canyon, San Joaquin Co., April 1938, *Hoover 3067* (TYPE, Gray Herb.); lower end of Corral Hollow, San Joaquin Co.,

April 1937, *Hoover 1744* (G); 2 mi. east of Midway, San Joaquin Co., March 1932, *Mason 6829* (G); near Madison, Yolo Co., April 1902, *Heller & Brown* (G); Colusa County, May 1884, *Curran* (G).

This plant has the calyx, corolla, and fruit of *P. fulvus* var. *campestris*, and the type of inflorescence and growth-habit of *P. canescens*. The base of the stem, the root, the midrib and margins of the leaves, and commonly even the calyx-margins, are charged with abundant purple dye. In *P. fulvus* of Chile, and in the coarser but otherwise similar Californian var. *campestris*, the stems spring from a rather well developed and persistent basal leaf-rosette and produce, usually forked, definite scorpioid cymes which are devoid of bracts or rarely produce only one or two near their base. The basal rosette in *P. infectivus* is poorly developed and short lived. The inflorescence is not well differentiated from the leafy stem, as is the case in *P. fulvus*. The flowers are produced along elongate branches with numerous interspersed leafy bracts and accordingly seem to be scattered along leafy stems. This type of inflorescence is exactly that of *P. canescens*. The gross habit of *P. infectivus* and *P. canescens* is very similar. The deeply lobed calyx and the nutlet with an annulate scar, however, quickly distinguish *P. infectivus* from that species.

**Plagiobothrys myosotoides** (Lehm.) Brand, Pflanzenr. [Heft 97] IV. 252<sup>2</sup>: 108 (1931).

*Lithospermum myosotoides* Lehm. Asperif. 319 (1818).

*Lithospermum tinctorium* R. & P. Fl. Peruv. 4, tab. 114 (1799); not Linn. (1753).

*Plagiobothrys tinctorius* Gray, Proc. Am. Acad. 20: 283 (1885); Johnston, Contr. Gray Herb. 78: 80 (1927).

CALIFORNIA: ridge between Isabel Valley and Arroyo Bayo, Mt. Hamilton Range, Santa Clara Co., in loose shale under dense chaparral, 2500 ft., April 28, 1935, *C. W. & H. K. Sharsmith 1893* (G); Big Sandy Valley, east base of Black Mt., Fresno Co., May 17, 1938, *R. F. Hoover 3465* (G).

The two Californian collections above cited have been compared with a large series of *P. myosotoides* from South America and agree so closely with the austral material, in all technical details and intangibles of habit, etc., that I am confident that they must represent that species, heretofore unreported from North America. In South America typical *P. myosotoides* ranges in Chile from the prov. of Bio Bio north to Coquimbo (lat. 30°–38°), usually well below 5000 ft. alt. It reappears further north, and naturally at higher altitudes (10–15000 ft.) in middle-western and southern Peru and adjacent Bolivia (lat. 11°–17°). The two Cali-

fornian stations, one in the South Coast Ranges about 8 miles east of Mt. Hamilton Observatory, and the other in the Sierran foothills, 20–25 miles northeast of Fresno, are in areas which have been given a careful botanical exploration only recently. Neither are areas in which a recently introduced plant from Chile might be expected to appear. I am forced to the opinion that *P. myosotoides* is a native of California, but rare, local and only recently detected. It is another addition to the list of Californian borages which have an immediate close relative in Chile and Argentina or which divide their range between California and in these South American countries; e.g., *Coldenia Nuttallii*, *Cryptantha circumscissa*, *Plag. fulvus* var. *campestris* (var. *typica* in Chile), *Plag. acanthocarpus* (*P. gracilis* in Chile), *Plag. californicus* (*P. collinus* in Chile), *Pectocarya pusilla*, *Pectocarya linearis* var. *ferocula*, *Amsinckia tessellata*, etc.

Among the Californian species *P. myosotoides* is most closely related to *P. Torreyi* Gray. It is a more slender and erect plant with slightly smaller fruit and much more roughened nutlets. The nutlets of *P. Torreyi* have the back marked by broad smooth low-convex transverse ridges which are usually separated by parallel lineate grooves. In *P. myosotoides* the back of the nutlet is usually roughened by narrow crests and papillae, and the ridges are more irregular and usually separated by broad irregular interspaces. Both species have the herbage charged with a purple dye. *Plagiobothrys Torreyi* is a montane plant, of the Yellow Pine Belt. *Plagiobothrys myosotoides*, in California, comes from much lower altitudes in the chaparral. The two species are certainly closely related. Typical *P. myosotoides* differs from *P. Torreyi* in habit, but *P. verrucosus* of Patagonia (which perhaps may be no more than a variety of *P. myosotoides*) has exactly the habit of *P. Torreyi* and its var. *diffusus*, and has less roughened nutlets than *P. myosotoides* though these never become as smooth and as regularly marked as in the Californian *P. Torreyi*. In this group of species exact definition of species has become difficult.

The group connects with *P. tenellus* (Nutt) Gray through *P. shastensis* Greene. The basal constriction of the nutlet, producing the characteristic cruciform nutlets of *P. tenellus*, is usually present in *P. shastensis*, but it is usually less pronounced and may rarely be almost absent. The herbage varies in the amount of purple dye present. It is one of the dye-stained forms of *P. shastensis*, having weakly constricted nutlets, which was described as *P. Torreyi* var. *perplexans* Johnston. This latter variety had best go into the synonymy of *P. shastensis*.

Mention should be made of an unnamed plant immediately related to



*P. myosotoides*, which was recently collected by John Thomas Howell at The Pinacles, San Benito Co., 1937, no. 12905, and at Santa Lucia Camp, Santa Lucia Mts., Monterey Co., 1936, no. 2416. These are plants having the dye-stained herbage, the slender branching habit, and the nutlets of *P. myosotoides*. In fact they differ only by having the calyx armed with uncinat bristles. The collections came from opposite sides of the Salinas Valley. The uncinat hairs are not developed in the South American forms of *P. myosotoides* and, furthermore, are probably unique in the genus. Consequently this plant, otherwise similar to *P. myosotoides*, can not be an introduction from South America, and if it is native to California I can not see why the collections of *P. myosotoides* from Santa Clara and Fresno counties can not be accepted as native also.

***Cryptantha dissita*, sp. nov.**

Herba annua erecta 5–25 cm. alta; caulibus simplicibus vel non raro medium versus ramulos ascendentes breves 1–2 gerentibus, villosio-hispidis, pilis gracilibus haud pungentibus 0.5–1 mm. longis erectis et appressis; foliis oblongis ligulatis vel lineari-oblongis 6–20 mm. longis 2–3 mm. latis utrinque villosio-hispidis, supremis paullo reductis, infimis subcongestis, reliquis 3–15 mm. distantibus; pilis folii 1–1.5 mm. longis gracilibus saepe curvatis griseis haud abundantibus erectis vel ascendentibus e basi subbulbosa orientibus; cymis ternatis ebracteatis pedunculum nudum 1–6 cm. longum terminantibus 3–10 cm. longis; floribus numerosis, maturitate 5–15 mm. distantibus; corolla alba, limbo 4–6 mm. diametro, tubo (in sicco brunneo) ca. 2 mm. longo, lobis calycis floriferi aequilongo; calycibus fructiferis 5–6 mm. longis basim versus 2–2.5 mm. crassis, lobis supra nuculis conniventibus deinde erectis vel ascendentibus, costa incrassata pilis 1–2.5 mm. longis rigidis pungentibus 5–10 e basi bulbosa orientibus armata, alibi praesertim marginem versus loborum villosis (pilis 0.5–1 mm. longis adpressis); ovulis 4; nuculis 1–4 (saepe 2–4), abaxialari semper maturante, 2–2.5 mm. longis laevibus nitidis maculatis 2.5-plo longioribus quam latis, dorso convexis, latere rotundis, ventre subplanis vel late obtusis, sulco omnino clauso imam ad basim late furcato; gynobasi ca. 1 mm. longo; stylo apicem nuculi distincte attingente vel breviter sed distincte superante.

CALIFORNIA (Lake County): hills about Scotts Valley, 6 mi. northwest of Lakeport, May 30, 1902, *J. P. Tracy 1744* (G); near foot of grade west of Lakeport, May 1, 1938, *M. S. Baker 8956* (TYPE, Gray Herb.); on Hopland highway a few miles west of Lakeport, May 5, 1934, *M. S. Baker 7648* (G); near Lakeport, May 1, 1930, *M. S. Baker 4939* (G).

The three collections by M. S. Baker, above cited, came from a single locality where the plant is locally very common on a tuffaceous outcrop of about an acre in extent. Growing with this *Cryptantha*, and also confined to this outcrop, are a number of plants with disrupted ranges along the inner Coast Ranges. The *Cryptantha* is evidently related to that variable plant of west-central California, south of San Francisco Bay, which I have called *C. hispidissima* Greene. It differs in its erect sparingly branched stems, its subequal leaves which tend to be congested below, its conspicuous corollas, and its well formed naked terminal ternate cymes which are projected above the leaves on a naked peduncle. This proposed species is obviously an outlying relative of *C. hispidissima*, local in a special habitat over a hundred miles north of the range of that more southern species.

***Cryptantha hispidula*** Greene ex Baker, West Amer. P. 2: 10 (1903), nomen; Brand, Pflanzenz. [Heft 97] IV. 252<sup>2</sup>: 60 (1931).

CALIFORNIA. N a p a C o . : Knoxville, colonies on rocky slopes, May 8, 1903, *C. F. Baker 2966* (G, ISOTYPE); about 2 mi. north of Knoxville on road to Lower Lake, April 1936, *M. S. Baker 8172*; Pope Creek, on serpentine hill on road near Pope Valley, April 1937, *M. S. Baker 7816*; Pope Valley road near Pope Valley, 1936, *M. S. Baker 8758* (G); serpentine east of Pope Valley along road to Monticello, April 1938, *M. S. Baker 8939*. C o l u s a C o . : serpentine hill along Highway no. 20 (Clearlake to Williams), May 17, 1937, *M. S. Baker 8656* (G). S o n o m a C o . : near entrance to Sulphur Creek Canyon near highway, 1934 and 1936, *M. S. Baker 7775* and *8608* (G). L a k e C o . : Binkley Ranch, between Cobb Mt. and Adams Springs, June 25, 1933, *Jussel* (G); serpentine hill a few miles east of Middletown, along highway, 1935, *M. S. Baker 8128*; dry slope of lava-gravel, 3 mi. north of Middletown on road to Lower Lake, May 1935, *Clausen 1035* (G); a mile east of Lower Lake near highway, April 1934, *M. S. Baker 7764* (G); summit of ridge west of Leesville, Colusa Co., in gravel among chaparral, 2000 ft., May 1919, *Heller 13124* (G).

The name *Cryptantha hispidula* Greene was first published in a list of exsiccatae distributed by C. F. Baker and subsequently appeared on the printed specimen-label associated with his no. 2966 which had been collected near Knoxville, Napa County. Greene never published a description of this species. Brand, finding the unpublished name on Baker's specimen at Berlin, adopted the name and described three varieties of this species, namely, the var. *eu-hispidula* (including *Baker 2966* from Napa Co. and *Elmer 3936* and *Eastwood 67a* from Santa Barbara Co.),

the var. *Elmeri* (from Washington and Oregon), and finally the var. *Abramsii* (based upon *C. Abramsii* Johnst. from near San Pedro, Los Angeles Co.). I have accepted *Baker 2966* as the obvious type of *Cryptantha hispidula* Greene ex Brand. The collections from Santa Barbara are *C. Clevelandii* var. *florosa* Johnst. The specimens cited under the var. *Elmeri* Brand, represent forms of *C. Hendersonii* (Nels.) Piper having a single polished nutlet. The var. *Abramsii* is a synonym of *C. Clevelandii* Greene.

The species, *C. hispidula*, replaces *C. Clevelandii* Greene and *C. hispidissima* Greene in the North Coast Ranges. These two relatives of *C. hispidula* are known only from the region south of San Francisco Bay. From them *C. hispidula* differs in its short style, which never reaches to the tip of the nutlets, in the very short inconspicuous hairs of the stem, which are never distinctly bristly, and in the consistently dimerous or trimerous slender elongate cymes. The species seems to be a plant of serpentine. Dr. Milo S. Baker writes me, "regarding the influence of serpentine on the borage flora of the North Bay counties. I know of only two species that seem to have a definite serpentine habitat. These are *C. hispidula* and *Allocarya tenera*. In Lake and Napa counties one may confidently expect to find *C. hispidula* somewhere on a serpentine outcrop. As for *A. tenera* I have collected it only in two localities and both of these are serpentine."

### ***Cryptantha spithamea*, sp. nov.**

Herba annua erecta 5–20 cm. alta; ramis numerosis ascendentibus saepe simplicibus 1–2 mm. crassis plus minusve brunnescentibus cum pilis 0.4–1 mm. longis plerumque appressis haud abundanter vestitis; foliis firmiusculis lineari-oblongatis vel linearibus 5–15 mm. longis 1–3 mm. latis, utrinque pilis saepe e pustulis orientibus appressis haud abundantibus vestitis, inferioribus oppositis mox deciduis majoribus 1–10 mm. distantibus, superioribus quam inferioribus dimidio minoribus saepe angustioribus; cymulis scorpioideis 3–6 cm. longis geminatis ebracteatis 1–2 cm. longe pedunculatis vel solitariis, floribus inferioribus bracteatis; floribus ut videtur uniseriatis, superioribus congestis, inferioribus non raro ad 1 cm. distantibus; corolla alba, limbo 1.5–2 mm. diametro, tubo ca. 2 mm. longo lobis calycis aequilongo; calycibus fructiferis strictis vel stricte ascendentibus 3–5 mm. longis, lobis linearibus quam nuculis saepe duplo longioribus, in costa pilis rigidis curvatis vel sinuosis armatis alibi pilis gracilibus mollibus appressis vestitis, apice erectis vel maturitate plus minusve divergentibus; ovulis 4, abaxiali semper maturante; nuculis 1 vel rariter 2 lanceoideis 2–2.5 mm. longis

laevibus nitidis, basi truncatis, apice acuminatis, dorso convexis, ventre obtusis, sulco clauso imam ad basim in areolam triangularem aperto; gynobasi ca. 1.5 mm. alto; stylo ca. 0.5 mm. longo, ad 0.5 mm. infra apicem nuculae attingente.

CALIFORNIA. Mariposa Co.: 3 mi. northwest of Coulterville, locally quite abundant on serpentine, May 16, 1937, *R. F. Hoover 2169* (TYPE, Gray Herb.); 2 mi. northwest of Coulterville, May 9, 1938, *Hoover 3394* (G). Tuolumne Co.: near Moccasin Creek near power-house, May 9, 1938, *Hoover 3388* (G); 3 mi. south of Chinese Camp, May 9, 1938, *Hoover 3380* (G).

This species is a member of the *Leiocarpace* and is probably most closely related to *C. hispidula* Greene of the serpentine areas of the inner North Coast Ranges. It is the only member of its group known from the Sierran foothills. From *C. hispidula* it differs in its solitary or geminate spikes and more elongate calyx-lobes. The plants are smaller and more abundantly and strictly branched.

***Cryptantha Ganderi*, sp. nov.**

Herba annua e basi ramosa 1–4 dm. alta; ramis dichotome ramosis pilis saepe 1–2 mm. longis divaricatis munitis; foliis elongatis angustis 2–5 cm. longis 2–3 mm. latis, apicem versus aliquantum attenuatis, apice saepe obtusis, utrinque hispidis; pilis 1–2 mm. longis ascendentibus vel erectis saepe e basi pustulato-bulbosa orientibus; cymis scorpioideis solitariis terminalibus vel ex axillis foliorum caulinarum superiorum orientibus ebracteatis 5–15 cm. longis maturitate laxifloris; corolla alba inconspicua 2.5 mm. longa; calycibus subsessilibus sub anthesi 2–5 mm. longis mox accrescentibus fructiferis 6–10 mm. longis; lobis maturitate linearibus rigidis costatis, infra medium conspicue (2.5 mm. longe) flavescenteque hispidis, supra nulis conniventibus deinde erectis vel divergentibus; ovulis 4, saepissime 3 abortis; nulis laevibus vel obscurissime et sparsissime subrugulosis nitidis plus minusve maculatis solitariis vel raro duobus lanceoideis acuminatis 1.5–2 mm. longis, dorso convexis, margine rotundis, ventre late obtusis vel rotundis, sulco clauso basim versus saepe in areolam triangularem parvam apertam furcato; gynobasi 1–1.5 mm. longo; stylo ca. 0.5 mm. longo ad 0.8–1 mm. infra apicem nuculae attingente.

CALIFORNIA: near school at Borego Valley, *Larrea-Franseria* association, 500 ft. alt., April 15, 1938, *Frank Gander 5328* (TYPE, Gray Herb.); Borego Spring, San Diego County, April 9, 1932, *Epling & Robinson* (G). BAJA CALIFORNIA: sandy wash 23 miles east of Pozo Aleman on road to Barril, March 3, 1935, *Wiggins 7844* (G). SONORA:



22 miles south of Sonoyta on road to Punta Peñasco, semistabilized dunes with *Abronia*, March 14, 1936, *Keck 4163* (G).

A desert relative of the characteristically coastal *C. Clevelandii*. It is readily distinguished by its larger nutlets, much accrescent calyx, and very slender elongate calyx-lobes. The abaxial nutlet is always developed and is usually twice the length of the gynobase. The style reaches up to only  $2/3$  to  $3/5$  the height of the nutlet.

***Cryptantha Wigginsii*, sp. nov.**

Herba annua laxae ascendentis ramosa 1–2 dm. alta; caulibus 1–2 mm. crassis, pilis 0.5–1 mm. longis saepe appressis falcatis inconspicue spar-seque vestitis; foliis 1–4 cm. longis 1.8–4 mm. latis linearibus vel lineari-oblongis, pilis appressis rectis utrinque vestitis, apice obtusis; cymulis scorpioideis simplicibus bracteis foliaceis 1–2 ornatis densifloris 1–3 mm. longe pedunculatis; calycibus subsessilibus fructiferis ca. 4 mm. longis, lobis costatis infra medium ca. 0.7 mm. latis apicem obtusum versus 0.3 mm. latis, in costa pilos e basi bulboso-pustulata orientes rigidos divaricatos 1–2 mm. longos gerentibus, alibi pilos gracillimos appressos gerentibus; corolla alba, tubo ca. 2 mm. longo 1 mm. crasso lobis calycis subaequilongo, limbo 3–3.5 mm. diametro; nuculis 1–4 ca. 2.1 mm. longis 0.9 mm. latis homomorphis (nucula abaxiali subpersistente) cinereis plus minusve maculatis, basi truncatis, apice acutis, margine infra medium acutis et supra medium rotundis, dorso convexis supra medium dense verrucosis vel congeste sinuateque rugulosis subopacis et infra medium laevibus nitidis, ventre apicem versus verrucosis alibi laevibus et nitidis; sulco clauso imam ad basim abrupte furcato; gynobasi 1.3 mm. longo; stylo ca. 0.4 mm. longo ca. 0.2 mm. infra apicem nuculae attingente.

BAJA CALIFORNIA: Rancho Cuevas, 18 mi. south of Tia Juana, gentle slope along ocean, very rocky red-clay soil, April 2, 1931, *Ira L. Wiggins 5107* (TYPE, Gray Herb.).

This is probably a relative of *C. Clevelandii* Greene but is readily distinguished from that species and allies by its roughened nutlets. Below the middle the back of the nutlet is smooth lustrous and somewhat mottled. Above the middle the back is roughened by minute wart-like tuberculations or by low sinuous ridges resulting from the confluence of the warts. There are 4 ovules and all frequently mature into nutlets. The abaxial nutlet is always present. The scorpioid cymes are solitary or rarely geminate and are always leafy bracted towards the base.

***Cryptantha Clokeyi*, sp. nov.**

Herba annua 10–15 cm. alta erecta; caulibus solitariis praesertim

medium versus longe ascendentem ramosis, pilos 0.5–1.3 mm. longos graciles rigidiusculos caulis basim versus erectos alibi appressos gerentibus; foliis lineari-lanceolatis crassiusculis infimis plus minusve congestis 2–3 cm. longis 2 mm. latis, supremis conspicue reductis, medianis 1–3 cm. distantibus, faciebus laminae pilos 0.7–1.5 mm. longos erectos vel appressos saepe (praesertim faciebus superioribus) e pustulis manifestis erumpentes gerentibus; cymis 3–6 cm. longis solitariis vel geminatis, floribus perspicue uniseriatis inferioribus ad 5–9 mm. distantibus, infimis bracteis subulatis 5–10 mm. longis oppositis; corolla alba, limbo (lobis ascendentibus) 2 mm. diametro, tubo ca. 2 mm. longo quam lobis calycis linearibus 0.5–1 mm. brevioribus; calycibus fructiferis 7–10 mm. longis 1–2 mm. longe pedicellatis; lobis lanceolatis longe attenuatis quam nuculis 2–3-plo longioribus (basim versus usque ad 2 mm. latis, supra medium minus quam 0.6 mm. latis) supra nuculos conniventibus deinde erectis vel curvato-ascendentibus, plus minusve costatis in costa pilis gracilibus 2–3 mm. longis ornatis reliquo pilis numerosis adpressis praesertim marginem versus villosis; nuculis 4 aequalibus triangulari-ovatis ca. 2 mm. latis et 3 mm. longis minute granulatis et conspicue papillatis vel tuberculatis, apice acutis, basi truncatis, dorso convexis, margine angulatis vix incrassatis, ventre obtusis; sulco clauso vel aperto basim versus late furcato; gynobasi apicem nucularum vix attingente; stylo nuculas evidenter superante.

CALIFORNIA: north of Barstow, San Bernardino Co., 2800 ft., April 25, 1935, *I. W. Clokey & E. Ganderson 6859* (TYPE, Gray Herb.).

A very distinct species belonging to the Muricatae and perhaps most closely related to *C. Hooveri* Johnst. of the Sierran foothills of central California. The new species differs in its much coarser habit, elongate cymes of much larger flowers, broad leaves, larger and more elongate nutlets, and protruding style. The gross habit of *C. Clokeyi* suggests a very coarse form of *C. nevadensis* var. *rigida* Johnst. The coarse broad nutlets of *C. Clokeyi*, however, are very different from the slender attenuate nutlets of *C. nevadensis*. The discovery of this unusually distinct new species in the middle Mohave Desert is most unexpected. The plant is probably rare and local since Mr. Clokey has failed to rediscover it along the road north of Barstow where he originally found it.

### ***Cryptantha fastigiata*, sp. nov.**

Planta herbacea vel suffruticosa annua vel saepissime subpersistens 1–10 dm. alta; caulibus erectis vel ascendentibus solitariis vel pluribus abundanter ascendentem ramosis, pilis antrorse valdeque adpressis 0.5–1 mm. longis et pilis sparsioribus erectis rigidis 1–2 mm. longis e

basi pustulata erumpentibus vestitis; caulibus vetustis basim versus non raro plus minusve duris et lignosis ad 8 mm. crassis; foliis numerosis anguste oblanceolatis vel lineari-oblanceolatis caulis apicem versus gradatim reductis, inferioribus 3–10 mm. latis 4–6.5 mm. longis, supra medium latioribus, basim versus in petiolum 1–10 cm. longum gradatim attenuatis, apice acutis, utrinque sparse hirsutis (pilis 1–1.5 mm. longis e basi plus minusve conspicue pustulata erumpentibus), subtus prominenter mediocostatis sed enervatis; cymis unilateralibus scorpioideis solitariis vel geminatis laxifloris sparse minuteque bracteatis; corolla alba, tubo ca. 1 mm. longo quam lobis calycis tertia parte brevior, limbo 3–4 mm. diametro; calyce fructifero 3 mm. longo 1–2 mm. longe pedicellato, lobis infra medium costatis lineari-oblongis pilos rectos rigidos erectos 1–1.5 mm. longos et pilos 0.5 mm. longos appressos gerentibus haud villosis; ovulis 4; nuculis heteromorphis triangulari-ovatis nigris tuberculis et margine pallidis ornatis compressis, dorso convexis, ventre late obtusis; sulco apicem versus nuculae angustato, infra medium nuculae in areolam conspicuam expanso; nucula abaxialari maxima persistente majore 1.5–1.9 mm. longa; nuculis 3 consimilibus 1–1.5 mm. longis; gynobasi elongato ca. 1 mm. longo; stylo rigido nuculas maximas 0.5–1 mm. longe superante.

BAJA CALIFORNIA: Puerto Refugio, Angel de la Guardia Island, 1921, *Johnston 3374* (G); Las Animas Bay, 1921, *Johnston 3505* (TYPE, Gray Herb.); San Esteban Island, 1921, *Johnston 3175* (G); South San Lorenzo Island, 1921, *Johnston 4192* (G); 5–6 m. west of Barril, March 1935, *Wiggins 7828* and *Shreve 6992* (G); 40 mi. east of San Ignacio, March 1935, *Shreve 7055* (G); Santa Rosalia, 1889 and 1938, *Palmer 188* and *Gentry 3779* (G); San Marcos Island, 1921, *Johnston 3621* (G); Carmen Island, 1890 and 1931, *Palmer 846* and *Collins, Kearney & Kempton 238* (G).

This species ranges in the middle third of the peninsula of Baja California and on the adjacent islands in the Gulf of California. It has passed as a form of *C. racemosa* (Wats.) Greene and was so treated in my monograph of the genus, *Contr. Gray Herb.* 74: 32–3 (1925), and in my report on the flora of the islands in the Gulf of California, *Proc. Calif. Acad.*, ser. 4, 12: 1147 (1924). Notes on the habit of the plant may be found in the latter report. This plant is most certainly not a form of *C. racemosa*! That latter species has a very different range. From the northernmost part of Baja California *C. racemosa* extends through the hottest and driest parts of the Colorado and Mohave deserts in eastern California, western Arizona and southern Nevada. It becomes a loosely and repeatedly much branched small bush and bears its slenderly long-

pedicellate flowers in a unique type of loose sympodium that is very much more racemose than scorpioid. The well developed biseriate scorpioid cymes, the shorter pedicels, and the long fastigiate stems quickly distinguish *C. fastigiata* from *C. racemosa*. In habit and in most details *C. fastigiata* is very similar to *C. holoptera* (Gray) Macbr., but that latter has larger, very broadly winged, homomorphic nutlets. The closest relative of *C. fastigiata* is *C. inaequalis* Johnst., of southernmost Nevada and adjacent California. In all details, save range and growth-form, it is remarkably similar to *C. fastigiata*. However, *C. inaequalis* is a slender herbaceous annual 1–3 dm. tall with the stems proportionately better branched. The young stems in the inflorescence are clothed with very slender, 0.5–1 mm. long, loosely appressed hairs. In the peninsular species the younger parts of the stem are covered with coarser shorter closely appressed hairs and the hairs are more conspicuously encrusted and hence duller than in *C. inaequalis*.

**Cryptantha Rattani** Greene, Pittonia 1: 760 (1888).

CALIFORNIA (Monterey Co.): along the Carmel River 20 mi. south-east of Carmel, July 1929, *Wolf* 3772 (G); right bank of the Carmel River 3 mi. above the Mission, April 1903, *Heller* 6587 (G); Soledad, May 1881, *Congdon* 72 (G); "Monterey County," 1887, *Hickman* (TYPE, Herb. Greene).

When he published *C. Rattani*, Greene stated that he had received his first material of the species from Rattan, who thought it was undescribed. This material came from near San Jose and Greene then considered it "a state of the common *C. flaccida* with larger corollas and more spreading habit, for the specimens were young and only beginning to flower." Subsequently Hickman sent Greene "a plant in good fruit" which revealed the characters of the species. There is no collection from Rattan, labeled "*C. Rattani*," in the Greene Herbarium at Notre Dame University, though the Hickman plant, so labeled, is preserved there. I suspect that Rattan's immature specimens were not preserved by Greene and that his identification of the Rattan and Hickman collections was based on his recollection of the former. In any case the description of *C. Rattani* was based upon the fruiting plants supplied by Hickman and, despite the name of the species, the Hickman plant from Monterey County must be taken as type. The few specimens of this interesting species, at hand, all come from the country just inland from Monterey, California, and suggest that it may be endemic in that area. Perhaps after all Rattan's plant from San Jose may not have been conspecific with the plant of Hickman. The species has the gross aspect of a plant of



*C. hispidissima* Greene but has tuberculate nutlets, and well developed corollas indicating its affinities with *C. intermedia* (Gray) Greene. West of the Coast Ranges, *C. intermedia* or its relatives is not known between San Luis Obispo County and San Francisco Bay. This local relative of *C. intermedia* in the Monterey area is of some interest and it is hoped that collectors will watch for it when working in the region.

***Cryptantha pterocarya* (Torr.) Greene var. *stenoloba*, var. nov.**

A forma typica speciei differt lobis calycis fructiferi conspicue elongatis lanceolatis 5–8 mm. longis ca. 1 mm. latis quam nuculis 1.5–2.5-plo longioribus.

ARIZONA: between Mesquite and Littlefield, Mohave Co., 1500 ft. alt., April 17, 1937, *Kearney & Peebles 13184* (G); near Arizona-Nevada line, sandy desert, April 4, 1934, *Maguire 4972* (G). NEVADA: 15 mi. east of Glendale, Clark Co., 4000 ft., May 19, 1933, *Maguire & Blood 4466* (TYPE, Gray Herb.).

A plant of the valley of the lower Virgin River in Nevada and adjacent Arizona where it appears to replace the ordinary form of the species. It has the one wingless and the three broadly winged nutlets of typical *C. pterocarya*, but differs conspicuously in its very elongate narrower calyx-lobes.

***Cryptantha Grahamii* Johnston, Jour. Arnold Arb. 18: 231 (1937).**

UTAH: shale hillside near Willow Creek, 22 mi. south of Ouray, 5500 ft. alt., June 16, 1937, *R. C. Rollins 1716* (G); very dry knoll, east slope of Big Pack Mt., 4 mi. west of Willow Creek, 6000 ft., stems one to few, June 15, 1937, *Rollins 1707* (G).

This remarkable species was described from flowering material, but now, thanks to Mr. Rollins, I can supply a description of the fruit from new material obtained at the type locality. The species keys out in Payson's monograph to *C. sobolifera* Payson, *C. aperta* Payson or *C. Sheldonii* Payson, but it is not related closely to any of these. The species is truly a very distinct one.

Fruit ovoid, the coarse style surpassing it by about 2 mm.; nutlets 4, oblong-lanceolate, 3.5–4 mm. long, 1.8–2 mm. wide, margins touching, knife-like, both faces of nutlets with inconspicuous small low rounded tuberculations, these distinct or somewhat confluent into short irregular rounded ridges; groove straight, extending from near base to near apex, open, very narrowly linear or cuneate-linear, edges not thickened.

***Cryptantha Rollinsii*, sp. nov.**

Planta biennis griseo-viridis hispida; caulibus erectis 1–2 dm. altis

simplicibus solitariis vel raro 2-3 e radice simplice palari erumpentibus; foliis crassiusculis rigidis evidenter costatis utrinque pilos breves graciles erectos vel ascendentes et pilos rigidos longos e basi pustulata orientes erectos conspicue gerentibus; foliis basalibus abundanter pustulatis dense rosulatis sub anthesi desiccatis ca. 3 cm. longis ca. 6 mm. latis paullo infra apicem latioribus deinde basim versus in petiolum 1-2 mm. latum gradatim attenuatis; foliis caulinis 3-5 cm. longis, 5-8 mm. latis, pluribus, superioribus paullo reductis, 1-2 cm. distantibus, oblanceo-spathulatis vel anguste oblongis, apice obtusis; floribus in glomerulis densis 3-6 floris 1-2 mm. longe pedunculatis ex axillis bractearum foliacearum 1-2(-3) cm. longarum erumpentibus; thyrsos obovoideo vel subcylindrico 2-3 cm. crasso 3-5 cm. longo infra medium interrupto; calyce sub anthesi 7-8 mm. longo, lobis lineari-cuneatis extus villosulis et hispidis ad 2 mm. infra appendiculam corollae attingentibus; calycibus fructiferis 8-9 mm. longis induratis, basi in pedicellum crassum rigidum ca. 1 mm. longum abrupte contractis; corolla alba, tubo 7-9 mm. longo subcylindrico, limbo 7-8 mm. diametro ascendente, lobis suborbicularibus 2.5-3 mm. latis, appendiculis faucis trapeziformibus puberulentibus; staminibus infra medium vel apicem versus tubi affixis; nuculis 4 elongatis ca. 3.5 mm. longis 1.5 mm. latis utrinque sublaevibus solo marginem versus obscurissime sparse rugulosis et tuberculatis, dorso convexis, margine anguste alatis, ventre obtusis, sulco recto a basi usque ad apicem nuculae gestis, clauso vel anguste aperto, basi abrupte lateque furcato, margine nullo modo incrassato.

UTAH (Uinta Basin, Uinta Co.): shale hillside on Thornes Ranch near Walker Creek, 22 mi. south of Ouray, 5500 ft., June 16, 1937, *Reed C. Rollins 1715* (TYPE, Gray Herb.); shale breaks, east side of Willow Creek, about 5 mi. north of mouth of Agency Draw, 5500 ft., fl. white, May 22, 1935, *E. H. Graham 8938* (G); talus slope, fl. white with green tube, west side of Green River, south of mouth of Sand Wash, 4500 ft., May 27, 1933, *Graham 7870* (G).

This plant was first sent me by Dr. Graham and though I believed it to be new I did not then publish it as a new species since both of his specimens were flowering plants lacking mature nutlets. Thanks to Mr. Rollins, however, I have since received excellent mature specimens from the same region in which Graham first encountered it. It proves to be a very distinct species having elongate exserted white tubular-funnel-form corollas, simple bristly stems, and small nearly smooth nutlets. The gross aspect of the plant is most suggestive of *C. Bradburiana* Payson. The nutlets most suggest those of the Sierran *C. nubigena* Payson. In Payson's monograph it keys out to *C. oblata* Payson. None of these

species can be considered as a close relative of *C. Rollinsii*. In truth the species is such a distinct one that I can find no species that is clearly an immediate relative of it.

***Cryptantha nubigena*** (Greene) Payson, Ann. Missouri Bot. Gard. 14: 265 (1927).

*Oreocarya nubigena* Greene, Pittonia 3: 112 (1896).

*Cryptantha Clemensae* Payson, Ann. Missouri Bot. Gard. 14: 267, fig. 26-28 (1927).

This is a species endemic to the high Sierras, from Tulare and Inyo north to Mono and Tuolumne counties, California, chiefly between 10,000 and 12,000 ft. The type of *Oreocarya nubigena* came from the summit of "Clouds Rest" in Yosemite National Park from an altitude of about 9900 ft. The material of the species available to past monographers of this group has been very poor and scanty. Payson saw a poor isotype of the species and mistakenly identified it with plants of eastern Oregon and adjacent northernmost California. The few reasonably good specimens of this plant of the southern Sierras available to Payson he described as a new species, *C. Clemensae*. This latter name consequently falls into the synonymy of *C. nubigena* and the plant of Oregon, mistakenly called "*C. nubigena*," being without name, may be described as a new species, as follows:

***Cryptantha subretusa***, sp. nov.

Herba perennis caespitosa; caulibus pluribus e radice lignosa erumpentibus 5-18 mm. altis simplicibus pilos 1-2 mm. longos et pilos abundantiores 0.5-1 mm. longos conspicue gerentibus basi persistentibus foliis marcescentibus dense vestitis; foliis basalibus congestis late spatulatis 1-4 cm. longis crassis persistentibus tomentulosis maturitate griseis, lamina orbiculata vel transverse elliptica 4-8 mm. lata apice rotunda vel truncata vel subretusa basi in petiolum 0.7-2 mm. latum abrupte contracta; foliis caulinis spatulatis vel lineari-oblongis numerosis quam internodiis conspicue longioribus; faciebus folii setas appressas 1-2 mm. longas e basi pustulata orientes et pilos rigidos 0.5-1 mm. longos saepe plus minusve tortuosos et appressos valde abundantes gerentibus; inflorescentia subcylindrica densa saepe 2-3-plo longiore quam crassa 1-2.2 cm. diametro; cymis congestis numerosis scorpioideis saepe 7-9-floris in tertia parte superiore caulis gestis; rhachi cymae 5-12 mm. longa; corolla alba, limbo 3-6 mm. diametro, tubo 3-4 mm. longo lobis calycis villosis et hispidis subaequilongis; calycibus maturitate elongatis 5-7 mm. longis 3-4 mm. diametro 0.5-1.5 mm. longe pedicella-

tis; nuculis oblongo-lanceolatis 2.8–3.7 (–4.8) mm. longis, 1.6–1.9 (–2.2) mm. latis basim obtusam versus latioribus anguste marginatis, dorso convexis inconspicue tuberculatis vel breviter rugulosis, facie interiore sublaeve vel inconspicue sparseque tuberculata vel rugulosa obtusa fere per totam longitudinem sulcata; sulco lineari vel subulato basim versus inconspicue expanso.

NEVADA: Santa Rosa Mts., Humboldt Co., July 11, 1898, *Cusick 2028* (G). CALIFORNIA (Siskiyou Co.): crest of long bare easterly slope of Mt. Eddy, 7500 ft., in compact gravel, July 9, 1920, *Heller 13435* (NY); near summit of Redshale Mt., east of Medicine Lake, pumice sand, 8000 ft., Aug. 18, 1923, *Applegate 3869 A* (G). OREGON: Crater Lake, Klamath Co., pumice slope of Cloud Gap, 8000 ft., 1934 and 1936, *Applegate 8198* (St.), 10875 and 10878 (G); Crater Lake, pumice slope on rim, 7000 ft., 1935, *Thompson 12206* (TYPE, Gray Herb.); Crater Lake, eastern rim in deep sand, 1924, *M. S. Baker 629* (G); Crater Lake, pumice near rim, 1929, *Wynd 1637* (G); about 4 mi. northwest of Adel, Lake Co., high sterile slope, June 1937, *Peck 18480* (G); above Blitzen Gorge, open rocky crest of Steens Mt., Harney Co., 9000 ft., July 1935, *Thompson 12152* (G); Pine Creek, Baker Co., alpine perennial, Sept. 1879, *Cusick* (G); east side of Lostine Canyon, 18 mi. above Lostine, Wallowa Co., July 1933, *Peck 17854* (St.; NY); above Jewett Lake, dry talus slope a mile south of Arenoid Lake, Wallowa Co., July 1933, *Peck 18063* (NY, St.); above Ice Lake, on high sterile slope, Wallowa Co., July 1934, *Peck 18511* (NY, St.).

The account of *C. nubigena* given in Payson's monograph applies almost entirely to this new species. Most of the specimens he cites, his description of the species, and his illustration of the nutlet, belong to *C. subretusa*. As I have indicated above, *C. nubigena* is endemic to the crests of the southern Sierras of California and does not approach, within 250 miles, the range of *C. subretusa*. The Californian plant differs from *C. subretusa* in being a weaker, more slender, more bristly plant with less firm, green, acute or obtuse basal leaves, much smaller smoother nutlets and a more interrupted inflorescence with a capitate terminal cluster and scattered smaller lateral ones below.

The present plant though evidently distinct from the Sierran *C. nubigena* is involved in the puzzling complex of forms containing *C. Sheldoni* (Brand) Payson and *C. celosioides* (Eastw.) Payson. These latter species need more study. I am of the opinion that the name *C. celosioides* should be extended to cover most of the coarse large-flowered plants of low altitudes found in Washington and Oregon and consequently most of the forms which Payson has referred to *C. Sheldoni*. The type of *C.*



*Sheldoni* represents one of several peculiar forms, probably local species, found in northeastern Oregon. Generally *C. subretusa* may be distinguished from the other species of Oregon by its elongate nutlet, and tomentulose thickish obtuse, truncate or subretuse basal leaves. Perhaps to it belong certain robust plants from southern Oregon (near Paisley, Lake Co., *Peck 15648*) and adjacent California (Lava Beds Nat. Monument, Siskiyou Co., *Applegate 9486* and *10514*). Flowering material from Warner Mts., Oregon (*Austin & Bruce 2270*) and from Steens Mt. (*Applegate 5645*) seems to have the habit of *C. subretusa* but the corollas are large and suggest those of *C. celosioides*.

***Cryptantha hypsophila*, sp. nov.**

Herba perennis caespitosa; caulibus pluribus e radice profundo lignoso erumpentibus 5–15 cm. longis simplicibus hispidis pilos 2–3 mm. longos rigidos divaricatos et pilos abundantes 0.5–1 mm. longos tortuosos conspicue gerentibus; foliis basalibus 1–2.2 cm. longis 2–4.5 mm. latis spathulatis marcescentibus infra apicem latioribus deinde basim versus gradatim attenuatis apice rotundis utrinque tomentulosis pilis brevibus abundantibus et setis appressis e basi pustulata orientibus vestitis; foliis caulinis pluribus conspicuis saepe hispidis spathulatis vel lineari-spathulatis; inflorescentia thyrsoida 1.5–2 cm. crassa 2–5 cm. longa densiflora subglobosa vel subcylindrica; cymis numerosis congestis glomeratis 3–7-floris; corolla ca. 7 mm. longa, tubo ad 4 mm. crasso lobis calycis aequilongo, limbo ad 5 mm. diametro; calyces fructifero 6–8 mm. longo; nuculis oblongo-lanceolatis 3–4 mm. longis 1.4–1.8 mm. latis anguste marginatis apice acutis, basi obtusis, dorse convexis inconspicue tuberculatis, ventre sublaevibus obtusis fere per totam longitudinem sulcatis; sulco lineari vel cuneato basi late furcato.

IDAHO (Blaine Co.): crest of high barren ridge at head of Boulder Creek, Sawtooth Mts., 11,000 ft., Aug. 6, 1937, *J. W. Thompson 14129* (TYPE, Gray Herb.); alpine rocky slopes of Mt. Hyndman, Sawtooth Range, 9500 ft., July 30, 1936, *Thompson 13628* (G); loose slide rock, Smoky Mts., 9500 ft., *Macbride & Payson 3771*, in pt. (G). .

This species is known only from south-central Idaho, Blaine County, over 150 miles east of the range of *C. subretusa*. Macbride, Contr. Gray Herb. 49: 65 (1917), and Payson, Ann. Missouri Bot. Gard. 14: 265 (1927), identified this isolated plant of Idaho as a form of *C. nubigena*. Its relations, however, are not with the true *C. nubigena* of California but with the plant of Oregon formerly confused with it, namely *C. subretusa*. The Idaho plant is more spreading and bristly and has smaller nutlets and narrower less firm leaves that are obtuse or acute at apex.

***Cryptantha Coryi*, sp. nov.**

Planta biennis saepe robusta e radice palari valida lignosa erumpens; caulibus pluribus erectis rigidis 15–45 cm. altis (basim versus 2.5–5 mm. crassis) saepe hispidis setas rigidas appressas vel patentes et pilos minutos flexuosos abundantes gerentibus; foliis basalibus 5–14 cm. longis crassiusculis lineari-oblongeolatis apicem acutum vel obtusum versus 4–10 mm. latis saepe strigoso-tomentulosis setas appressas 1.5–3 mm. longas rigidas e basi pustulata erumpentes et pilos minutos appressos gerentibus; foliis caulinis numerosis saepe 1.5–2 cm. distantibus saepe 2–3 cm. longis lineari-oblongis vel oblongo-lanceolatis 3–4 mm. latis acutis; cymis 3–10 scorpioideis ascendentibus elongatis e axillis foliorum supremorum erumpentibus 10–20-floris, maturitate 5–20 mm. distantibus, supremis 5–13 cm. longis, inferioribus gradatim brevioribus, thyrsus 7–18 cm. longum 4–9 cm. crassum haud densum formantibus; floribus fructiferis 3–10 mm. distantibus; bracteis cymae 5–10 mm. longis evidentibus lineari-lanceolatis; calyce sub anthesi 4–6 mm. longo subsessili, maturitate 6–10 mm. longo 1–5 mm. longe rigideque pedicellato setis et pilis minutis vestito saepe hispido; corolla alba 6–8 mm. longa, limbo 6–7 mm. diametro patente, tubo 4–5 mm. longo quam lobis calycis paullo longiore; nuculis 4 laevibus angulatis 2.5–3 mm. altis et latis eis *C. Jamesii* similibus margine haud conniventibus.

TEXAS: 16 mi. northeast of Ft. Stockton, Pecos Co., 1933, *Cory 5599* (G); about 2 mi. west of Longfellow, Pecos Co., Apr. 15, 1936, *V. L. Cory* (TYPE, Gray Herb.); near Persimmon Gap, Brewster Co., fl. white, 1931, *McKelvey 1979* (G); 55.8 mi. south of Alpine, Brewster Co., Apr. 13, 1936, *Cory* (G); Feodora, Terrell Co., dry rocky plain, 1928, *E. J. Palmer 33575* (G); 8 mi. east of Langtry, Val Verde Co., Apr. 6, 1939, *Cory* (G); 7 mi. southeast of Del Rio, Val Verde Co., April 1, 1939, *Cory* (G); Big Spring, Howard Co., stony hills, June 11, 1900, *Eggert* (G); Big Spring, deep sand, 1928, *E. J. Palmer 34009* (G); Ross Place, Tom Green Co., 1929, *Cory 651* (G); Upper Concho, sandy hills and plains, *Reverchon 2120* (G); between Uvalde and Del Rio, fl. white, 1931, *McKelvey 1891* (G); without data, *Wright 1566*, in pt. (G).

This is the plant of Texas which Payson treated as "*C. Palmeri*." It is known from Reeves and Brewster east to Howard, Tom Green and Kinney counties, Texas, and is evidently different from the type and only known collection of *C. Palmeri* (Gray) Payson, from the mountains south of Saltillo, Coahuila. The Mexican plant is a perennial with a slender multicapital caudex producing more slender and more densely strigose basal leaves, more slender stems, smaller corollas with a dis-

tinctly narrower limb, and finally an inflorescence of glomerules rather than elongating scorpioid cymes. The coarse habit, the biennial root and the very well developed elongate scorpioid cymes quickly distinguish *C. Coryi* from true *C. Palmeri* of Mexico. I do not believe that these two species are even immediately related. As Payson has indicated this Texan plant has affinities with *C. Jamesii* var. *multicaulis* (Torr.) Payson. The true Mexican, *C. Palmeri* has its closest relation in *C. crassipes* described below.

***Cryptantha crassipes*, sp. nov.**

Herba cinerea e radice perenni valida cortice nigrescente obtecta oriens; caulibus pluribus erectis simplicibus 6–30 cm. altis plus minusve hispidis setis longis et pilis mollibus brevibus laxe appresseque vestitis, basi ima persistentibus induratis, basibus petiolorum marcidis crasse squamoso-vestitis caudicem crassum multicipitalem conspicuum formantibus; foliis basalibus congestis crassiusculis lineari-spathulatis vel anguste lineari-oblongeolatis 4–6 cm. longis 2–6 mm. latis utrinque dense pallideque strigosis (indumento e setis 1–2 mm. longis rigidis e basi pustulata orientibus et pilis ca. 0.5 mm. longis flexuosis mollibus composito) apice obtusis vel rotundis; foliis caulinis sparsis 1.5–3 cm. distantibus 1–2 cm. longis indumento laxo appresso vestitis plus minusve hispidis; floribus glomeratis sub anthesi in inflorescentiam capitatam densam 1–2.5 cm. diametro caulem sparse foliatum terminantem aggregatis; inflorescentia fructifera ambitu obovata vel oblongo-obovata ex glomerulo terminali multifloro 2.5–3 cm. diametro congesto latiore quam longo et infra glomerulum maximum ex glomerulis 1–3 parvis 1–5-floris 1–2 cm. longe pedunculatis in axillis foliorum supremorum 1–2 cm. longorum 5–25 mm. distantium gestis composita; cymis omnino glomeratis fructiferis congestis vix longioribus quam latis haud elongato-scorpioideis; corolla ut videtur alba conspicua, limbo patente ca. 8 mm. diametro, lobis orbicularibus ca. 2.2 mm. diametro, tubo ca. 9 mm. longo; calyce sub anthesi ca. 9 mm. longo, lobis cuneatis fere apicem tubi corollae attingentibus setis et pilis laxo appressis dense vestitis, maturitate paullo accrescentibus, 1–3 mm. longe pedicellatis; nuculis 4 fructum hemisphaericum formantibus crassis angulatis 3.5–4 mm. longis ca. 3 mm. latis a dorso visum orbiculari-triangularibus vel ovato-triangularibus, margine lateraliter conniventibus dorso convexis opacis inconspicue rugulosis, ventre angulatis sublaevibus, sulco angustissimo lineato.

TEXAS (Brewster Co.): tributary of Alamo de Caesario, 18 mi. north of Terlingua, April 3, 1939, *V. L. Cory* (G); 55 mi. south of Alpine,

April 13, 1936, *Cory* (G); 6.5 mi. east of Agua Fria Springs, April 13, 1936, *Cory 18613* (TYPE, Gray Herb.).

This interesting species comes from the Big Bend region of Texas. It is probably most closely related to the plant collected by Edward Palmer in the mountains south of Saltillo, Coahuila, and the one properly bearing the name, *C. Palmeri* (Gray) Payson. Both species are perennials having a multicapital caudex, narrow pallid densely strigose basal leaves and an inflorescence of glomerules rather than elongating scorpioid cymes. The Texan plant, however, is coarser than the Mexican plant and has a much coarser heavier caudex, non-bristly calyx-lobes, and a corolla-limb nearly twice as broad. The type and only known collection of *C. Palmeri* is immature and ripe nutlets are unknown. The mature nutlets of *C. crassipes* are rugulose. The only other member of the group of *C. Jamesii* (Torr.) Payson, to which *C. crassipes* and *C. Palmeri* belong, which has roughened nutlets is *C. oblata* (Jones) Payson. This latter species ranges in Texas from El Paso southeastward into Presidio County. It has elongating scorpioid cymes, exerted corolla-tube, tuberculate nutlets, and a less persisting root.

***Hackelia Sharsmithii*, sp. nov.**

Herba perennis; caulibus gracillimis pluribus simplicibus rigidiusculis fragilibus 1–2 mm. crassis inconspicue strigosis 1–3 cm. altis erectis vel ascendentibus, basi vestigiis petiolorum emarcidorum fuscis conspicue obtectis, caudicem multicapitem formantibus; foliis viridibus obscure nervatis utrinque inconspicue strigosis; foliis inferioribus majoribus, lamina lanceo-elliptica vel oblongo-lanceolata 4–7 cm. longa 14–30 mm. lata, apice acuta vel obtusa, basi in petiolum alatum 2–6 cm. longum contracta; foliis caulinis 6–9 sessilibus oblongis vel ovatis vel lanceo-ovatis 2–3.5 cm. longis 8–18 mm. latis, apice acutis, basi rotundis vel cordatis; cymis racemiformibus terminalibus geminatis vel ternatis (raro solitariis in axillis foliorum superiorum) maturitate 2–10 cm. longis 2–14-floris plus minusve bracteatis, bracteis saepe omnino subulatis inconspicuis 1–2 mm. longis rariter 1–2 grandibus foliaceis 5–20 mm. longis et 3–10 mm. latis; calyce sub anthesi 2–2.7 mm. longo sparse strigoso, lobis lanceolatis, pedicellis 1–6 mm. longis; corolla azurea ca. 4 mm. longa, limbo ad 6 mm. diametro, tubo ca. 2 mm. longo non raro medium versus constricto, lobis ca. 1.7 mm. longis apice rotundis; appendiculis forniculibus lunatis, margine superiore ciliolatis, latere interiore valde convexus; antheris ca. 0.2 mm. longis apice fere sinus lorum corollae attingentibus; pedicellis fructiferis laxo recurvatis ad 12 mm. longis; nuculis 4 sine margine 2.6–3 mm. longis et 1.1–1.4 mm.



latis lanceolatis, margine appendiculis coerulescentibus subulatis 1.3–1.9 mm. longis (apice glochidiatis) basim versus plus minusve confluentibus ornatis, dorso convexis granulatis plus minusve muricatis et appendiculatis, (appendiculis 1–3 ca. 1 mm. longis); gynobasi 1–1.2 mm. longo; stylo ca. 1 mm. longo.

CALIFORNIA: shelter of rocks in cirque northwest of Consultation Lake, Lone Pine Canyon, Inyo County, 12,000 ft., Aug. 19, 1937, *C. W. Sharsmith* 3280 (G); shelter of boulders on recent moraine in cirque east of Mt. Muir, Inyo Co., 12,100 ft., Aug. 20, 1937, *Sharsmith* 3336 (G); shelter of granite boulders above Mirror Lake, Lone Pine Canyon, Inyo Co., 11,000 ft., Aug. 21, 1937, *Sharsmith* 3354 (TYPE, Gray Herb.); in shelter of rocks, summit of Boreal Plateau, southwest of Siberian Outpost, Tulare County, 11,400 ft., Aug. 27, 1937, *Sharsmith* 3415 (G).

This remarkable species is a recent discovery in the Mt. Whitney region in the high southern Sierras of California. The species sets the southwestern limit for the genus in the United States and presents a new type of habitat and a new growth-form for the genus. The plant grows under rocks above timberline and has short brittle spreading tufted leafy stems and accordingly a gross habit very suggestive of the dwarf alpine and subalpine *Mertensias* found in the Rocky Mountains. Nothing like it is known in *Hackelia*. Its habit represents a transition between the relatively coarse erect habit characteristic of most *Hackelias* and that of the slenderly caulescent and sparingly strigose Asiatic species of *Eritrichium*. Furthermore *H. Sharsmithii* frequents the arctic-alpine region which heretofore has been thought to be characteristic of *Eritrichium*. The two genera are now revealed as differing in little more than the direction of their fruiting pedicels,—erect or slightly curved outward in *Eritrichium* and decurved or reflexed in *Hackelia*. It is indeed surprising that this very distinct plant could remain unknown in the reasonably well botanized area about Mt. Whitney and then be collected by one botanist at four different stations in a single season. It ranks along with *Mertensia bella* Piper and *Cryptantha Thompsonii* Johnst., as one of the most distinct and interesting additions to the borage-flora of the Pacific States which has been made in the past twenty-five years.

***Pectocarya heterocarpa* (Johnston), comb. nov.**

*Pectocarya penicillata* var. *heterocarpa* Johnston, Contr. Gray Herb. 70: 37 (1924).

This plant is undoubtedly distinct from *P. penicillata* (H. & A.) DC. It differs in fruit, calyx and geographic distribution. The fruit borne on

the branches consists of 4 nutlets the opposed ones on each side being more or less similar and differing from the other pair in size, form, and attachment. One pair of nutlets is more or less ascendingly curved and is usually margined. The other pair is more or less recurving and unmargined with the adaxial nutlet bent back against and frequently somewhat adhering to the pedicel. The calyx is strongly oblique and asymmetrical. The abaxial side of the fruiting calyx is elongate. The floral receptacle is prolonged obliquely out on the abaxial side, and the pedicel appears to be lateral in attachment. In fact the elongated distorted receptacle seems to be merely a broadened prolongation of the pedicel bearing a pinnate arrangement of unequal sepals. The calyx-lobes are very unequal even at anthesis. The two distal abaxial lobes are nearly equal and are obviously the largest. The larger of these two distal lobes subtends a margined ascending nutlet, the shorter one a decurved unmargined nutlet. The remaining three lobes of the calyx are successively smaller and project (at right angles) from along the side of the elongate receptacle. The smallest (ca. 1 mm. long) is the one nearest the pedicel and at maturity it projects laterally out from under the adaxial decurved unmargined nutlet. In *P. penicillata* the calyx is supported by a centrally attached pedicel and the calyx and lobes are not obliquely distorted. The four nutlets are each subtended by consimilar calyx-lobes. A single reduced lobe projects out between the two axial nutlets. This type of calyx is normal for the genus. The obliquely distorted calyx which I have described for *P. heterocarpa* is a very conspicuous and real departure from this normal type and it is otherwise known only in *P. peninsularis* newly described below. I have found no transitions connecting it with the normal type of calyx. This remarkable development in *P. heterocarpa* supplementing such other characters of the species as the heteromorphy of nutlets within the fruit and the abundance of distinctive (perhaps cleistogamic) fruit about the very base of the plant, leave little doubt as to its specific distinctness. It is one of the very distinct species in the genus! *Pectocarya heterocarpa* ranges from northern Sonora, through the southwestern half of Arizona, north into southern (Clark County) Nevada and extreme southwestern (Washington County) Utah, and west into the Colorado and Mohave deserts of California (north to the Death Valley area). It probably occurs in extreme northeastern Baja California, as an extension south from the Colorado Desert, though I have seen no specimens from actually south of the Californian boundary. In middle Baja California it is represented by the closely related *P. peninsularis*. True *P. penicillata* has a very different range. From Wyoming, Idaho and eastern Washington, with an outlying station in the dry in-



terior of British Columbia, it ranges south into the northern half of Nevada and, west of the Sierra Nevada, south into coastal southern California and northwestern Baja California. It occasionally extends through the low passes onto the edge of the Mohave and Colorado deserts as for example near Mohave, Elizabeth Lake, and Jacumba, but always remains easily distinguished from *P. heterocarpa*.

The strongly heteromorphic nutlets and the distorted calyx of *P. heterocarpa* give new reasons for believing that the genus *Harpagonella* is, indeed, a much modified derivative of *Pectocarya*, characterized by its much accrescent and highly specialized irregular calyx and modified fewer nutlets. The two largest calyx-lobes of *P. heterocarpa* are the homologues of the distal pair of lobes in other *Pectocaryas* and also of the two united lobes forming the beak in *Harpagonella*. A study of the calyx at anthesis, and later, seems to show that these two lobes are abaxial in position. This places the odd reduced lobe next to the axis which is a position rare and unusual among the Gamopetalae, and in fact among all dicotelydons.

***Pectocarya peninsularis*, sp. nov.**

Herba annua gracillima prostrata strigosa vel hispidula basi caules paucos vel multos 5–15 cm. longos gerens; foliis angustis linearibus 1–4 cm. longis 0.5–1 mm. latis; floribus dimorphis; floribus infimis imam ad basim caulis gestis verisimiliter cleistogamicis; nuculis florum infimorum valde heteromorphis 2 mm. longis ad 1 mm. latis apicem versus latioribus, nucula abaxialari evidenter marginata (margine dentato) sparse strigosa, nucula axialari pedicello plus minusve adnata haud marginata dorse convexa straminea subglabra, nuculis lateralibus inconspicue marginatis strigosis; floribus caulinis chasmogamicis; nuculis florum caulinarum heteromorphis ad 2 mm. longis, nucula abaxiali margine pallido 0.5–0.8 mm. lato grosse dentato (apicibus dentium in pilum uncinatum productis) conspicue ornata in ambitu superne visa elliptico-ovata; nuculis lateralibus abaxiali plus minusve similibus, margine inconspicuo dentibus subulatis distantibus armatis.

BAJA CALIFORNIA: 26 mi. south of Pozo Aleman, March 4, 1935, *Shreve 7004* (G); 11 mi. southeast of Mesquital, Feb. 8, 1935, *Haines & Stewart* (G); wash 2 mi. north of Millers Landing, Feb. 10, 1935, *Haines & Stewart 160* (G); Playa Santa Catarina, March 10, 1930, *Wiggins 4442* (G); semidesert hills between El Marmol and Rosario, March 12, 1930, *Wiggins 4465a* (G); sandy wash at junction of El Marmol and San Fernando roads, 25 mi. from El Marmol, March 5, 1930, *Wiggins 4345* (G); Santa Marco Plains and low adjacent hills, 23.5 mi. south of Ham-

ilton Ranch, 100 ft. alt., March 3, 1930, *Wiggins 4305* (TYPE, Gray Herb.); flats 8 mi. north of Hamilton Ranch, a mile inland, March 2, 1930, *Wiggins 4291* (G); 7 mi. east of Santo Tomas, Feb. 2, 1935, *Shreve 6826* (G).

This species is closely related to *P. heterocarpa* and has the heteromorphic nutlets and distorted calyx of that species. It ranges in the mid-section of the peninsula of Baja California, while its relative is known south of the Mexican boundary only in northern Sonora. The peninsular plant differs in its smaller more broadly winged nutlets. In those nutlets of the heteromorphic fruit which are winged, the margin is spreading, broad, and coarsely toothed. Viewed from above these nutlets are elliptical-ovate rather than panduriform or oblong or linear-oblong. The four nutlets of the fruit are in one plane and not, as in *P. heterocarpa*, with two upcurving and two decurving. The axial nutlets are unmarginated, convex above and nearly glabrous.

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